

A MODEL FOR PREDICTING THE PERFORMANCE OF PROJECT MANAGERS IN MASS HOUSE BUILDING PROJECTS IN GHANA

DIVINE KWAKU AHADZIE, BSc (Hons), MSc.

A thesis submitted in partial fulfilment of the requirements of the
University of Wolverhampton for the degree of Doctor of
Philosophy
July 2007

This work or any part thereof has not previously been submitted in
any form to the University or to any other body whether for the
purpose of assessment, publication or for any other purpose. Save
for any express acknowledgements, reference and/or
bibliographies cited in the work, I confirm that the intellectual
content of the work is the result of my own efforts and no other
person.

The right of Divine Kwaku Ahadzie to be identified as the author of
this work is asserted in accordance with ss.77 and 78 of Copyright,
Designs and Patent Act 1988. At this date copyright is owned by
the author

Signature

Date

ABSTRACT

Presently, within the human resource management (HRM) genre and including the construction management discipline, the identification and development of appropriate performance measures is seen as the only viable means for validating and engendering managerial excellence. There is also a growing awareness that appropriate predictive modelling practices can help engender the identification and development of these measures. Against the background that project-based sectors of the construction industry in developing countries need to adopt a proactive approach towards recognising and embedding performance measures in HRM practices, this thesis addresses the development of a model for predicting the performance of project managers (PMs) in mass house building projects (MHBP) in Ghana.

A literature review of the significance of performance measures in the HRM genre is first presented including an evaluation of the methodologies for measuring the performance of PMs. This is followed by a review of research and development in the management of human resources in the construction industry in developing countries including Ghana.

Informed by the literature, an appropriate theoretical framework is adopted which draws on the organisational psychology theory of job performance, the conventional wisdom in project success criteria and an emerging framework of project lifecycle. Subsequently, a competency-based multidimensional conceptual model is developed. The conceptual model reflects both the elements of *performance behaviours* and *outcomes* in predicting the performance of PMs at the conceptual, design, tender, procurement, construction and operational phases of the project lifecycle.

Adopting positivism as an appropriate research paradigm, structured questionnaire survey is used to elicit the relevant data from property developers in Ghana for the construction phase of the project lifecycle. Subsequently the data is analysed using one-sample t-test, factor analysis and multiple regression analysis (stepwise).

From a broad range of competency-based measures used as independent variables, it is found that, the best predictors of the PMs' performance at the "construction phase" of MHBP are: *job knowledge in site layout techniques for repetitive construction works; dedication in helping works contractors to achieve works programme; job knowledge of appropriate technology transfer for repetitive construction works; effective time management practices on the house-units; ability to provide effective solution to conflicts while maintaining good relationships; ease with which the PM is approachable by works contractors; and volunteering to help works contractors solve personal problems*. These independent variables explained 74.4% of the variance in the model (at $p < 0.0005$). Validation of the model confirmed its goodness of fit and hence predictive accuracy. The findings suggest that at the construction phase of MHBP, PMs who exhibit these behavioural competencies are likely to achieve higher levels of performance. Accordingly, PMs who aspire to achieve better managerial performance outcome on

MHBPs should strive towards developing and improving these competencies.

It is contended that the developed model could be used by property developers for the selection and recruitment of potential PMs and also for developing appropriate training requirements towards best practice improvement in the implementation of MHBPs. While the study focuses on Ghana, there is the potential for the model to be adopted for use by other developing countries towards the advancement of improved HRM activities in project management practice.

ACKNOWLEDGEMENTS

My greatest acknowledgement goes to Professor David Proverbs, my director of studies for the immense assistance provided in terms of guidance, suggestions and encouragements throughout the research process. The memory he has implanted will forever remain. I wish to also acknowledge my second supervisor, Prof. Paul Olomolaiye for the various ways he has also contributed despite his busy schedule as Dean of school.

My appreciation also goes to Mr William Ahadzie and Dr. Adjei-Kumi, both of the Department of Building Technology, Kwame Nkrumah University of Science and Technology (KNUST) for their assistance in helping to collect the relevant data in Ghana. Subsequently, I must acknowledge two graduates of the Dept. of Building Technology (KNUST), namely; Miss Barabara Appiah and Miss Naa Adjeley, for the part they played in delivering and retrieving the completed questionnaires. May I also acknowledge Nii Okine-Tieku, an executive member of the Ghana Real Estate Developers Association (GREDA), for assisting in providing the registration list of the GREDA. Likewise, my appreciation goes to all the GREDA members who participated in the survey.

It is also important to recognise my research colleagues, especially Nii, Obuks, David, Tony, Nuhu, Elias, Raymond, Adams, Boye and Felix for the times we have shared together. I wish everyone the best for the future.

I sincerely thank my loving wife, Efuah and my children Senam, Edinam and Adzo for their understanding, love and support during this long, tedious and on many occasions strenuous journey. I wish to also express my gratitude to my good friend, Daniel Anoff and family for the generosity extended to my family during our stay in the UK

Last but not least, I wish to thank the Government of Ghana (GOG) for providing the scholarship funding.

Dedication

This Thesis is dedicated to all my family members, especially the memory of my late brother Kofi Ahadzie.

TABLE OF CONTENTS

A MODEL FOR PREDICTING THE PERFORMANCE OF PROJECT MANAGERS IN MASS HOUSE BUILDING PROJECTS IN GHANA..I	
ABSTRACT.....	III
ACKNOWLEDGEMENTS.....	V
DEDICATION.....	VI
TABLE OF CONTENTS.....	VII
LIST OF TABLES.....	XVI
LIST OF APPENDICES.....	XVII
CHAPTER 1: GENERAL INTRODUCTION.....	1
<u>1.0 INTRODUCTION.....</u>	<u>1</u>
<u>1.1 BACKGROUND TO THE RESEARCH.....</u>	<u>1</u>
<u>1.2 STATEMENT OF THE PROBLEM.....</u>	<u>5</u>
<u>1.3 RESEARCH QUESTIONS.....</u>	<u>5</u>
<u>1.4 AIM AND OBJECTIVES OF THE STUDY.....</u>	<u>6</u>
<u>1.5 RESEARCH METHODOLOGY EMPLOYED.....</u>	<u>8</u>
<u>1.6 DEFINITION OF PERFORMANCE.....</u>	<u>10</u>
<u>1.7 MAIN CONTRIBUTION TO KNOWLEDGE.....</u>	<u>10</u>
<u>1.8 DISSEMINATION OF THE FINDINGS.....</u>	<u>11</u>
<u>1.9 ORGANISATION OF THE THESIS.....</u>	<u>14</u>
<u>1.9 SUMMARY.....</u>	<u>17</u>

CHAPTER 2: A CRITICAL REVIEW OF PERFORMANCE MEASUREMENT IN THE HUMAN RESOURCE MANAGEMENT GENRE.....	19
<u>2.0 INTRODUCTION.....</u>	<u>19</u>
<u>2.1 PERFORMANCE MEASURES IN THE HUMAN RESOURCE MANAGEMENT CONTEXT.....</u>	<u>20</u>
<u>2.1.1 Towards Defining Performance Measures.....</u>	<u>20</u>
<u>2.1.2 The Significance of Performance Measures in HRM Practices.....</u>	<u>24</u>
<u>2.1.3 Development of Predictive Models and the Implication for PMs Performance Measures in Developing Countries.....</u>	<u>27</u>
<u>2.1.4 An Overview of Project Management Practices in Developing Countries.....</u>	<u>29</u>
<u>2.1.5 Towards identifying Performance Measures for PMs in Mass House Building Projects in Developing Countries.....</u>	<u>31</u>
<u>2.2 TOWARDS DEVELOPING A DEFINITION OF THE PROJECT MANAGER.....</u>	<u>33</u>
<u>2.3 MEASURING THE PERFORMANCE OF PROJECT MANAGERS.....</u>	<u>38</u>
<u>2.3.1 Traditional-Based Approaches.....</u>	<u>38</u>
<u>2.3.2 Personality-Based Approaches.....</u>	<u>40</u>
<u>2.3.3 Competency-Based Approaches.....</u>	<u>42</u>
<u>2.3.3.1 A definition for competency.....</u>	<u>42</u>
<u>2.3.3.2 Relevance of competency-based approaches.....</u>	<u>44</u>
<u>2.4 THE STRATEGIC IMPORTANCE OF COMPETENCY-BASED APPROACHES.....</u>	<u>46</u>

<u>2.5 EMERGING STUDIES ON PMs BEHAVIOURAL</u> <u>COMPETENCIES.....</u>	<u>49</u>
<u>2.6 IDENTIFYING AN APPROPRIATE COMPETENCY-BASED</u> <u>FRAMEWORK</u>	<u>54</u>
<u>2.7 SUMMARY.....</u>	<u>59</u>
CHAPTER THREE: A CRITICAL REVIEW OF RESEARCH AND DEVELOPMENT IN THE MANAGEMENT OF HUMAN RESOURCES IN DEVELOPING COUNTRIES.....	62
<u>3.0 INTRODUCTION.....</u>	<u>62</u>
3.1 TOWARDS IMPROVING HUMAN RESOURCE MANAGEMENT PRACTICES IN DEVELOPING COUNTRIES.....	63
<u>3.1.1 A Review of Performance Measurement Literature for</u> <u>Human Resource Development in Developing Countries.....</u>	<u>63</u>
<u>3.2 THE SIGNIFICANCE OF MASS HOUSE BUILDING</u> <u>PROJECTS TOWARDS IMPROVING HUMAN RESOURCE</u> <u>MANAGEMENT PRACTICES.....</u>	<u>67</u>
<u>3.3 DEFINING MASS HOUSE BUILDING PROJECTS</u>	<u>70</u>
<u>3.4 THE CHARACTERISTICS OF MASS HOUSE BUILDING</u> <u>PROJECTS IN DEVELOPING COUNTRIES.....</u>	<u>73</u>
<u>3.5 INTRODUCING THE STUDY AREA: THE CONTRUCTION</u> <u>INDUSTRY IN GHANA.....</u>	<u>77</u>
<u>3.5.1 The Geographical Location and Economic Profile of</u> <u>Ghana.....</u>	<u>78</u>
<u>3.5.2 The Institutional Profile and Significance of the</u> <u>Construction Industry.....</u>	<u>83</u>

<u>3.5.2.1 The institutional profile.....</u>	<u>83</u>
<u>3.5.2.2 The significance of the Ghanaian construction</u> <u>industry.....</u>	<u>84</u>
<u>3.5.3 The Housing Sector</u>	<u>86</u>
<u>3.5.4 Evolution of Management Practices in Mass House</u> <u>Building Projects in Ghana.....</u>	<u>88</u>
<u>3.5.5 Project Management Practices in Mass House Building</u> <u>Projects in Ghana.....</u>	<u>91</u>
<u>3.5.6 The Contribution of Project Managers to the delivery</u> <u>Mass House Building Projects.....</u>	<u>92</u>
<u>3.5.7 Towards Assessing the Performance of Project Managers</u> <u>in Mass House Building Projects in Ghana.....</u>	<u>97</u>
<u>3.6 THE WAY FORWARD FOR PMs' PERFORMANCE MEASURES</u> <u>IN GHANA AND THE RELEVANCE FOR OTHER DEVELOPING</u> <u>COUNTRIES.....</u>	<u>99</u>
<u>3.7 SUMMARY.....</u>	<u>100</u>
CHAPTER FOUR: DEVELOPMENT OF CONCEPTUAL MODEL .	104
<u>4.0 INTRODUCTION</u>	<u>104</u>
<u>4.1 BASIC ASSUMPTIONS ABOUT PERFORMANCE.....</u>	<u>104</u>
<u>4.2 THE THEORETICAL FRAMEWORK.....</u>	<u>108</u>
<u>4.2.1 Organisational Psychology Theory of Job Performance</u> <u>.....</u>	<u>110</u>
<u>4.2.2 Conventional Wisdom in Project Success Criteria.....</u>	<u>117</u>
<u>4.2.3 Developing a Project Success framework for Mass</u> <u>House Building Projects.....</u>	<u>122</u>
<u>4.2.4 Framework for Project Lifecycle.....</u>	<u>126</u>

4.3 DEVELOPING A ROBUST COMPETENCY- BASED	
CONCEPTUAL MODEL.....	128
4.3.1 A Competency-Based Conceptual Model for the Project	
lifecycle.....	129
4.3.2 An Abridged Competency-Based Conceptual Model for	
the Construction Phase.....	134
4.4 SUMMARY.....	136
CHAPTER FIVE: RESEARCH METHODOLOGY.....	139
5.0 INTRODUCTION	139
5.1 EPISTEMOLOGY, METHODOLOGY AND METHODS.....	139
5.2 CHOOSING AN APPROPRIATE RESEARCH	
METHODOLOGY	141
5.1.1 Methodological Paradigms.....	142
5.1.2 The Research Paradigm Adopted.....	147
5.2 THE RESEARCH METHOD.....	149
5.2.1 Presenting the Survey Instrument.....	151
5.2.2 The Survey Instrument Design.....	156
5.2.2.1 Demographic.....	156
5.2.2.2 Criteria for Performance Outcome (dependent	
variables).....	157
5.2.2.3 Contextual performance behaviours (independent	
variables).....	158
5.2.2.4 Task performance behaviours (independent	
variables).....	163
5.2.3 Ethical Considerations.....	166
5.3.3 Pilot study.....	167

<u>5.3 DATA COLLECTION.....</u>	<u>170</u>
<u>5.3.1 Introducing the Survey Participants.....</u>	<u>170</u>
<u>5.3.2 The Sampling Frame</u>	<u>171</u>
<u>5.3.3 Towards Establishing an Appropriate Sample Size.....</u>	<u>172</u>
<u>5.3.4 Commentary on the Fieldwork in Ghana.....</u>	<u>175</u>
<u>5.3.5 Data Entry and Editing</u>	<u>178</u>
<u>5.3.6 Questionnaire for evaluating aspects of output of results</u> <u>.....</u>	<u>179</u>
<u>5. 4 SUMMARY.....</u>	<u>180</u>
CHAPTER SIX: PRELIMINARY ANALYSIS OF DATA ELICITED FROM MEMBERS OF THE GHANA REAL ESTATE DEVELOPERS ASSOCIATION.....183	
<u>6.0 INTRODUCTION.....</u>	<u>183</u>
<u>6.1 ANALYSIS OF THE DEMOGRAPHIC DATA.....</u>	<u>183</u>
<u>6.2 STANDARDIZED OPINION OF RESPONDENTS ON THE</u> <u>PERFORMANCE LEVEL OF PMs in MHBP in GHANA</u>	<u>187</u>
<u>6.3 ANALYSIS OF DEPENDENT VARIABLES.....</u>	<u>188</u>
<u>6.3.1 One Sample T-test for Ranking Dependent Variables..</u>	<u>189</u>
<u>6.3.2 Factor Analysis of Dependent Variables.....</u>	<u>198</u>
<u>6.4 DISCUSSION OF RESULTS.....</u>	<u>211</u>
<u>6.4.1 Component 1: Environmental-safety criteria</u>	<u>211</u>
<u>6.4.2 Component 2, Customer satisfaction</u>	<u>213</u>
<u>6.4.3 Component 3: Quality</u>	<u>216</u>
<u>6.4.4 Component 4: Cost-time criteria.....</u>	<u>218</u>
<u>6.5 SUMMARY.....</u>	<u>220</u>

CHAPTER SEVEN.....	222
CHAPTER SEVEN: DEVELOPMENT OF A COMPETENCY-BASED PREDICTIVE MODEL.....	223
<u>7.0 INTRODUCTION.....</u>	<u>223</u>
<u>7.1 DEVELOPMENT OF PERFORMANCE OUTCOME INDEX</u>	<u>224</u>
<u>7.2 THE DEPENDENT VARIABLE.....</u>	<u>227</u>
<u>7.3 MULTIPLE REGRESSION ANALYSIS.....</u>	<u>228</u>
<u>.....</u>	<u>229</u>
<u>7.2. 2 Stepwise Selection.....</u>	<u>230</u>
<u>7.2.2 Test of goodness of fit.....</u>	<u>239</u>
<u>7.2.3 Residual Analysis.....</u>	<u>242</u>
<u>7.3 DISCUSSION OF THE RESULTS.....</u>	<u>246</u>
<u>7.3.1 Convergence of Findings with the Theoretical Framework Adopted.....</u>	<u>247</u>
<u>7.3.2 The Significance of the Competency Profiles towards Engendering the Performance of PMs in MHBPs</u>	<u>255</u>
<u>7.3.2.1 Task performance beahviours.....</u>	<u>257</u>
<u>7.3.3.2 The Contextual performance behaviours.....</u>	<u>260</u>
<u>7.4 RECOMMENDED APPLICATION OF THE COMPETENCY- BASED PROFILES</u>	<u>266</u>
<u>7.4.1 Team Deployment and Job-Matching.....</u>	<u>266</u>
<u>7.4.2 Recruitment and Selection.....</u>	<u>267</u>
<u>7.4.3 Career Development and Succession</u>	<u>268</u>
<u>7.4.4 Curriculum Development.....</u>	<u>271</u>
<u>7.5 SUMMARY.....</u>	<u>271</u>

CHAPTER EIGHT: VALIDATION OF THE COMPETENCY- BASED PREDICTIVE MODEL.....	274
<u>8.0 INTRODUCTION.....</u>	<u>274</u>
<u>8.1 THE CONCEPT OF VALIDATION.....</u>	<u>274</u>
<u>8.2 EXTERNAL VALIDATION.....</u>	<u>277</u>
<u>8.2.1 Background to the External Validation Analysis.....</u>	<u>277</u>
<u>8.2.2 Test Results for External Validation.....</u>	<u>280</u>
<u>8.2.2.1 Predictive accuracy across samples.....</u>	<u>280</u>
<u>8.2.2.2 Feedback from experts on the potential relevance of the findings viz. recommended application.....</u>	<u>283</u>
<u>8.3 INTERNAL VALIDATION.....</u>	<u>294</u>
<u>8.3.1. Convergence 1: Literature search, Questionnaire development and Analysis.....</u>	<u>295</u>
<u>8.3.1.1 Literature search and questionnaire development </u>	<u>295</u>
<u>8.3.1.2 Literature and Questionnaire analysis.....</u>	<u>295</u>
<u>8.3.2 Convergence 2: Questionnaire analysis and academic validity.....</u>	<u>300</u>
<u>8.3.3 Academic validity and literature search.....</u>	<u>301</u>
<u>8.4 SUMMARY</u>	<u>303</u>
CHAPTER NINE: CONCLUSIONS AND RECOMMENDATIONS	306
<u>9.0 INTRODUCTION.....</u>	<u>306</u>
<u>9.1 DEFINITION OF THE PROJECT MANAGER.....</u>	<u>307</u>
<u>9.2 RESEARCH QUESTIONS.....</u>	<u>308</u>
<u>9.3 REVIEW OF OBJECTIVES.....</u>	<u>308</u>

<u>9.4 CONCLUSIONS.....</u>	<u>318</u>
<u>9.5 CONTRIBUTION TO KNOWLEDGE.....</u>	<u>319</u>
<u>9.6 LIMITATIONS OF THE FINDINGS</u>	<u>322</u>
<u>9.8 RECOMMENDATIONS FOR FURTHER RESEARCH.....</u>	<u>324</u>
<u>9.9 RECOMMENDATIONS FOR INDUSTRY.....</u>	<u>326</u>
<u>9.9 SUMMARY.....</u>	<u>328</u>
REFERENCES.....	331
BIBLIOGRAPHY.....	388
APPENDICES.....	399

LIST OF FIGURES

LIST OF TABLES

LIST OF APPENDICES

APPENDIX 1: GENERAL ATTRIBUTES FOR EVALUATING THE PMS' PERFORMANCE.....	400
APPENDIX 2: POTENTIAL DIMENSIONS OF MANAGEMENT SKILLS PROFILE-INDUSTRIAL/PSYCHO PERSPECTIVE.....	403
APPENDIX 3: POTENTIAL DIMENSION OF PROJECT MANAGERS' SKILLS PROFILE IN CONSTRUCTION.....	404
APPENDIX 4: RESEARCH INSTRUMENT FOR DATA COLLECTION	410
APPENDIX 5: PRIOR NOTIFICATION TO POTENTIAL RESPONDENTS.....	421
APPENDIX 6: HISTOGRAM FOR HEALTH AND SAFETY OF INDIVIDUAL HOUSE-UNITS.....	422
APPENDIX 7: HISTOGRAM OF RISK CONTAINMENT.....	422
APPENDIX 8: HISTOGRAM OF OVERALL HEALTH AND SAFETY MEASURES.....	423
APPENDIX 9: HISTOGRAM OF OVERALL CUSTOMER/CLIENT SATISFACTION.....	424
APPENDIX 10: HISTOGRAM OF OVERALL PROJECT QUALITY.....	424
APPENDIX 11: HISTOGRAM OF QUALITY OF INDIVIDUAL HOUSE-UNITS.....	425
APPENDIX 12: HISTOGRAM OF RATE OF DELIVERY OF INDIVIDUAL HOUSE-UNITS.....	425

APPENDIX 13: HISTOGRAM OF RISK CONTAINMENT.....	426
APPENDIX 14: GUIDE TO CORRELATION MATRIX/CORRELATION MATRIX.....	427
APPENDIX 15: CORRELATION MATRIX OF REGRESSION ANALYSIS.....	430
APPENDIX 16: QUESTIONNIARE FOR VALIDATION OF THE POTENTIAL RECOMMENDED APPLICATION OF A MODEL FOR PREDICTING THE PERFORMANCE OF PROJECT MANAGERS IN MHBPS IN GHANA.....	431

CHAPTER ONE

Chapter 1: GENERAL INTRODUCTION

1.0 INTRODUCTION

This chapter, which is an overview of the thesis presents the research context in terms of the background of the study and statement of the research problem to be addressed. The justification and scope of the research and the main research questions posed are also illuminated. Subsequently, the aim and objectives are presented followed by a summary of the research methodology adopted. Thereafter, a statement of the contribution to knowledge and the significance of the research findings are described. The chapter concludes with an explanation of the organisation of the thesis including sub-themes under each chapter.

1.1 BACKGROUND TO THE RESEARCH

Improving human resource management (HRM) through the application of performance measures has been recognised as one of the most critical elements for organisational competitiveness and improvements (Austin and Vallinova, 1992; Picketts, 1998; Roberts, 1998; Garavan et al, 2002). Presently, within the HRM genre, the identification and development of appropriate performance measures is widely held as the only viable option for providing evaluative criteria, against which managerial

performance can be validated (see for example Conway, 2000; Abraham et al, 2001; Scullen et al, 2003; Ford, 2004). Accordingly, in project-based industries such as construction, performance measures are gradually being affirmed as a viable option for engendering superior performance levels of project managers (PMs) (Dainty et al, 2003; 2004). To this effect, the contemporary view is that appropriate modelling practices represent a potentially practicable option for developing the relevant metrics towards engendering the appropriate professional development of PMs (Dainty et al, 2004; Cheng et al, 2005; Dainty et al, 2005).

While construction represents one of the largest industries in developing countries, it has remained under-researched and underdeveloped in relation to the identification and development of performance measures for effective HRM practices (see for instance Imbert, 1990; Wachiru, 2000; Rwelamila, 2007). Historically, the industry has adopted a passive (or at best ad-hoc) approach towards dealing with the benchmarking of PMs' performance, resulting in the lack of a systematic framework towards the development of appropriate best practices (see for instance Rwelamila, 2007). Against the backdrop that the development of appropriate performance measures represents a potentially significant option for engendering managerial excellence, there is therefore the need for project-based sectors within the construction domain in developing countries to adopt a proactive approach towards performance measurement of the key

managerial personnel engaged in the industry. To this end, the identification and development of appropriate PMs' performance measures could be an important step towards the advancement of improved HRM practices in the construction industry in many developing countries, especially given the increasingly important role that PMs are playing in project management practices in recent times.

Mass house building projects (MHBPs) constitute the single largest construction sector in terms of employment of human resources and value-added in most economies (Wells, 1999; Zawdie and Langford, 2000). Subsequently, in many developing countries these projects have, by and large, emerged as the largest and most established project based sector in project management practice (see *ibid*).

Recently in Ghana, several of these large MHBPs have been constructed and/or are under construction (see Amoa-Mensah, 1999; 2002; President of Ghana, 2005). Furthermore, the contribution of PMs towards achieving effective managerial performance on these projects has also recently been underscored (Amoa-Mensah, 1999; 2002; Ahadzie et al, 2004). However, as a reflection of the industry in many developing countries, the dearth of rigorous research activities towards the identification and development of appropriate performance measures is also evident (Ahadzie et al, 2004). Identification and development of

appropriate performance measures could therefore enable PMs operating in Ghana to have a clear understanding of the significant skills they should acquire towards improving their own professional development. Furthermore, property developers could be provided with the benefit of a structured framework upon which they can select and recruit PMs who have the appropriate performance profiles and skills. To this effect, this research could serve as a foundation towards effective managerial practices in MHBPs.

Thus, this research is founded on the contention that, if the significance of performance measures is to be relevant in the construction industry in developing countries, then the underlying criteria that would help PMs to reflect positively on best practice improvement in MHBPs needs to be identified. This research therefore views the emphasis on MHBPs as a potentially significant foundation for contributing towards the research agenda for project-based sectors of the construction industry in developing countries. Accordingly, while the study focuses on MHBPs, it is hoped that the findings would be beneficial to other emerging sectors of the Ghanaian construction industry particularly in respect to the future development of appropriate performance benchmarks. While the study is unique to Ghana, there is also the potential that many project-based sectors of the construction industry in developing countries will find the findings useful towards the advancement of improved HRM practices.

1.2 STATEMENT OF THE PROBLEM

“The fundamental concept on which project management is based is that a single individual - the PM is accountable for the success of the project” (Goodwin, 1993).

Against the background information presented, the main research problem was identified thus; while performance measures are being renewed in the HRM genre including the construction management discipline as a viable option against which effective managerial performance can be validated, no rigorous attempt has been made to develop appropriate measures to assist PMs towards effective project management practices in developing countries such as Ghana. As such, aspiring and experienced PMs are unaware of the performance criteria that can help engender best practices in their managerial activities. Granted that project management practices differ across geographical regions (Crawford, 2005), this lack of recognising and embedding performance measures as a core HRM activity has the potential of threatening the development and promotion of effective project management practices in many construction sectors such as those relating to the implementation of MHBPs.

1.3 RESEARCH QUESTIONS

From the foregoing, three main research questions were proposed:

- What should be the appropriate performance framework for isolating the PMs' performance domain in MHBPs in developing countries such as Ghana?
- Given that the skills required by PMs are likely to develop and change as a project progresses throughout the project lifecycle, how should these be factored into the performance framework in MHBPs?
- In recognition of the unique (e.g. weak economic, technological and structural systems) and relatively difficult project environment (e.g. lack of economic and purposive rationality) prevailing in developing countries such as Ghana, what performance profiles are appropriate for engendering the professional development of PMs throughout the whole lifecycle of MHBPs?

1.4 AIM AND OBJECTIVES OF THE STUDY

The questions posed above (in section 1.3) engendered the key research aim, which was to identify through the development of a relevant predictive model, appropriate performance measures for PMs in MHBPs in the Ghanaian construction industry.

Consequently, the research sought to undertake these specific objectives:

- To undertake a critical review of recent developments in HRM practices, in particular, PMs towards developing a deeper understanding of their key performance measures.
- To undertake a critical review of literature on project management in developing countries towards identifying the contribution of PMs in achieving project success.
- To identify an appropriate theoretical framework for developing a conceptual model suitable for achieving the key research aim.
- To develop a conceptual model for predicting the performance of PMs in MHBPs adopting the theoretical framework identified.
- To develop a robust research design to elicit the relevant data from experienced practitioners and professionals in the construction of MHBPs in Ghana
- To employ appropriate statistical analysis to help develop the substantive model for predicting the potential performance

of PMs in MHBPs and hence identify the appropriate performance profiles.

- To test, refine and validate the model towards establishing its predictive accuracy and potential relevance for practical application.
- To disseminate broadly the research findings for the benefit of industry and academia.

1.5 RESEARCH METHODOLOGY EMPLOYED

In addressing the key research questions identified above, it was important to adopt an appropriate epistemological, ontological and axiological approach, which would enable appropriate data collection, analysis and interpretation of the findings for the benefit of practitioners and researchers. Subsequently, as in all researches, the study commenced with an extensive literature review to help provide a thorough understanding of the recent developments in the methodologies used for measuring the performance of PMs in the HRM research genre including the construction management discipline. The literature review provided profound opportunity to identify an appropriate theoretical framework for the study.

Drawing on (in particular) an organisational psychology theory of managerial job performance, a rigorous conceptual model was developed to help determine the precise direction of the research. Consequently, positivism as a research paradigm was adopted to reflect the epistemological, ontological and axiological approach involved. To this effect, a quantitative approach was used in eliciting the relevant data from property developers in Ghana. Subsequently, postal structured questionnaire survey was used in eliciting the main data (including piloting) and also in validating aspects of the findings relating to the potential relevance of the recommended application of the model. The research paradigm adopted also enabled statistical tools such as factor analysis and multiple regression analysis to be used in the interpretation of the data and discussion of the findings.

It must be noted that an underlying conception of this thesis was to help provide PMs specializing in the management of MHBPs in Ghana the opportunity to have a clear understanding of the competencies that their superiors (in particular their immediate employers) expect of them towards engendering excellent managerial practices. Subsequently, managing directors (MDs) of housebuilding companies in Ghana were approached in eliciting the relevant data. A detailed discussion of the research methodology including the rationale for eliciting the data from MDs is presented in chapter five.

1.6 DEFINITION OF PERFORMANCE

While there are many variables that affect the outcome of projects, the performance measures identified in the study reflected the factors within the control of PMs (i.e. those relating to improvement in their personal skills). Therefore, for the purposes of this thesis, the term “performance” is defined as the behavioural action (i.e. behavioural competencies) that are relevant to achieving the goals of project-based organisations (see for instance McCloy et al, 1994; Motowidlo et al, 1997; Brophy and Kiely, 2002). The implication of this definition is that; performance, behaviour and results are not the same. While behaviour is the observable things that people do while at work, performance is seen as behaviour with an evaluative component (ibid). Alternatively, results are viewed as conditions of things that are changed by performance and consequently contribute to or detract from organizational accomplishments (Motowidlo et al, 1997; Abraham et al, 2001). Further details of the explanation of these terms are provided in chapter four, section 4.3.

1.7 MAIN CONTRIBUTION TO KNOWLEDGE

It is well recognised that the performance domain of PMs is often influenced by the characteristics of different project types, industry classifications and project application areas (Ogunlana et al, 2002; Dainty et al, 2003; Crawford, 2006). It is also recognised that, the matching of skills to specific project based sectors is

important for developing the capabilities and prospects of PMs within these sectors (see for example Egbu, 1999; Ogunlana, 2002; Lyon, 2003). A prime contribution to knowledge of this study is that, it has identified a set of competency profiles that can be mapped and customised onto improving the current and projected future roles of PMs in MHBPs, especially in the context of developing countries

Equally, the findings provide an empirically-based evidence for Ghanaian property developers seeking to recruit, retain and promote PMs so that they (i.e. the property developers) can make informed and objective decision towards engaging those with the appropriate skills and competencies. Refer to section 9.5 for a more detailed presentation on the contribution to knowledge.

1.8 DISSEMINATION OF THE FINDINGS

The literature review culminated in the write-up of a total of seven papers which were presented in a number of major international conferences. These papers have now been published in the appropriate conference proceedings (see Table 1.1). Papers 1 to 5 represent the results of a rigorous critique of some of the recent publications on performance measurement and how they fit into the context of this research. Paper 6 published in the proceedings of Building and Education Research (Bear 2006) conference focussed on the development of the underlying conceptual model

for this study. Similarly, paper 7 published in the proceedings of the Association of Construction Management researchers (ARCOM 2006) annual conference focussed on the development of the research instrument which formed the basis for eliciting the relevant data for the study.

In addition, three journal papers were submitted for consideration in construction management journals. These papers address specific aspects of the empirical findings from the research. Paper 8 draws on the key findings of the research including the developed model and discusses the main contribution to knowledge of the research. Paper 9 proposes a more robust system for understanding the behavioural competencies of PMs in general. Paper 10 draws on the dependent variables and uses factor analysis to explore the potential success criteria of MHBPs. It is worth mentioning that papers 8 and 10 have since been accepted for publication (Appendix, 21 and 22/see also references). Paper 11 emphasises the key findings from the perspective of the Government of Ghana (GoG) (sponsors of the research) towards helping to shape future policy direction in regard to curriculum development for PM education and training in Ghana.

Whilst it is contended that the dissemination of various aspect of the research has made some significant contribution towards propagating the knowledge emerging from the research, it is also

worth noting that the benefits have indeed been mutual. It is therefore important to acknowledge that, the reviewers comments to all the papers currently published and reviewed provided opportunities for the methodologies, meanings and interpretation of the research to be challenged which has eventually helped to enrich the focus and content.

Table 1.1: Publications arising out of the research

Paper No.	Title of paper	Conference/Journal	Place/Location	Date/Remarks
1	Meeting Housing Delivery Targets in Developing Countries: The Contribution of Project Managers in Ghana.	Globalization and Construction in Developing Countries	Asian Institute of Technology, Bangkok, Thailand	11-13 th November, 2004
2	Construction Performance Measurement Systems: Emerging Research Needs	5 th International Postgraduate Research Conference	University of Salford, (UK)	17-19 th April, 2005
3	Project Managers' Performance Measures: A Fresh Perspective	Association of Construction Management Researchers (ARCOM)	University College of London, SOAS, (UK)	7-9 th September, 2005
4	Towards Project Managers Performance Measures: Some Methodological Challenges	Built Environment and complexity (Becon)	University of Liverpool (UK)	11-14 th September, 2005
5	A conceptual predictive model for evaluating the performance of project managers in Mass House Building Projects.	Building Education and Research Conference (BEAR)	Polytechnic University of Hong Kong	14.-17 th April, 2006
6	Redefining performance measurement systems: a multidimensional concept	International Conference in Built Environment in the 21 st Century (ICiBE, 2006)	Universiti Teknologi Mara, Malaysia	13-15 th June 2006

Paper No.	Title of paper	Conference/Journal	Place/Locaton	Date/Remarks
7	Development of Research Instrument for Project Managers Performance Measure in Mass House Building Projects	Association of Construction Management Researchers (ARCOM)	University of Central England, Birmingham	4-7 th September 2006
8	A Model for Predicting the Performance of Project Managers in Mass House Building Projects at the Construction Phase	Journal of Construction Engineering and Management, American Society of Civil Engineers		Tentatively accepted
9	Towards Redefining Performance Measures for Construction Project Managers: Should Contextual Performance Behaviours be Distinguished from Task Performance Behaviours?	International Journal of Project Management	UK	In press
10	Critical Success Criteria for Mass House Building Projects in Developing Countries	International Journal of Project Management	UK	In press
11	Towards Improving the Competency of Project Managers in Ghana: An Empirical Study	Ghana Journal of Science and Technology	Ghana	Under review

1.9 ORGANISATION OF THE THESIS

The thesis comprises of nine chapters and these have been organised as follows:

Chapter one deals with the background to the research including justification, the problem statement, research questions, aims and objectives, research methodology and the associated contribution to knowledge emanating from the research.

Chapter two addresses generic issues relating to HRM with particular reference to PMs' performance measures in project-based sectors of the construction industry. Subsequently, an appropriate definition of the term PM and performance measures is provided. Other relevant issues discussed here are methodologies for measuring the performance of the PM and what constitutes a robust methodology in regard to measuring and improving managerial competencies

In chapter three, a critical review of human resources development (HRD) programmes in developing countries including the development of project management knowledge in MHBPs is presented. Thereafter a critical review of the Ghanaian construction industry, in particular, the housing sector is also presented. The chapter then traces how management practices have evolved in MHBPs and the contribution that PMs have made towards engendering effective managerial performance. Against this background, the justification for the research in the Ghanaian context is re-emphasised.

Chapter four presents the development of the underlying conceptual model for the study. Issues discussed here include the various theoretical frameworks, namely: the organisational psychology theory of job performance: a project success framework; the development of a project success framework for MHBPs; framework for project lifecycle. Thereafter, a commentary on how these frameworks were combined to develop an appropriate conceptual model is provided.

Chapter five addresses the research methodology adopted. The research paradigm is described including the design of the research instrument and method for collecting the relevant data.

Chapter six addresses the preliminary analysis of the data collected. This includes descriptives analysis of demographic data and the use of appropriate statistical methods namely, one sample t-test and factor analysis on the dependent variables. Factor analysis was used to help reduce the dependent variables to a manageable size for the subsequent development of the model.

Chapter seven is devoted exclusively to the development of the substantive model including discussions of the findings and the potential recommended application. The application of multiple regression analysis, analysis of variance (ANOVA), multicollinearity test and residual analysis are reported here. An

in-depth discussion of the theoretical convergence and significance of the findings is also presented in this chapter.

Chapter eight describes the validation process and the methodology adopted in the validation procedure, namely external and internal validation. The validation processes are discussed in terms of the literary, conceptual and substantive domains of the research. Results of both the external and internal validation process lend reasonable support to the reliability and robustness of the predictive fit of the model and the literature search respectively.

Finally, in chapter nine, the fundamental objectives of the research are reviewed and highlighted. Conclusions drawn from the work are presented and recommendations are made.

1.9 SUMMARY

The background of the study including the problem statement, aim and objectives, scope and research methodology have been presented. The significance of the findings, in particular, aspects relating to the potential contribution to knowledge have been illuminated. The next chapter, (i.e. chapter two) introduces a critical review of performance measurement in the HRM genre, especially those relating to PMs' performance measures.

CHAPTER TWO

Chapter 2: A CRITICAL REVIEW OF PERFORMANCE MEASUREMENT IN THE HUMAN RESOURCE MANAGEMENT GENRE

2.0 INTRODUCTION

Chapter one broadly introduced the research aim and objectives and presented an overview of the organization of the thesis. This chapter provides a critical review of the development of performance measures as reflected in the human resource management (HRM) research and especially in the context of the construction industry. A working definition of the term project manager (PM) is then argued in the context of this research. Thereafter, the methodologies for measuring the performance of PMs are discussed including a thorough critique of their potential application in construction. This is then followed by an in-depth discussion of the emerging importance of competency-based methodologies in focusing the attention of PMs on continuing performance improvement. The chapter concludes with an evaluation of contemporary-based competency frameworks towards identifying the most appropriate option for satisfying the objectives of this research.

2.1 PERFORMANCE MEASURES IN THE HUMAN RESOURCE MANAGEMENT CONTEXT

This section begins by introducing issues relating to the definitions and significance of performance measures in HRM practices and is divided into two sub-sections. Sub-section 2.1.1 provides a chronology of some of the key definitions of performance measures and then draws on these as a foundation towards establishing an appropriate working definition for this research. Thereafter, sub-section 2.1.2 reflects on the significance of performance measures in the management of human resources. This is followed by a discussion on the relevance of predictive models towards identifying the relevant performance measures (section 2.1.3) and then a justification towards the need for identifying performance measures for MHBPs in developing countries (2.1.4).

2.1.1 Towards Defining Performance Measures

Various definitions of performance measures exist in the HRM field stemming from the different interpretations often given to the meaning of the term “performance” (see Yassamis et al, 2002). For instance, a long standing definition provided by Warren (1934) posited that performance measures could be defined as a standard for making qualitative comparisons or as the basis for making judgement (Austin and Vallinova, 1992). English and English (1958) also postulated four definitions thus: a basis for judgement;

a behavioural goal by which progress is judged; a measure of validity; a measure of predictability. Reber (1985) also defined performance measures as a standard against which judgement, evaluation or classification can be made. Scott (1917), Bechtoldt (1947), Weitz (1961) and Zammuto (1984) are among some of the long standing researchers who have also provided alternative definitions (see Austin and Vallinova, 1992).

Presently, contemporary researchers of HRM practices are still saddled with trying to identify what should be a concise definition (ibid). However, following, a comprehensive review of some of the key definitions from 1917 to “modern” times, Austin and Vallinova (1992) contended that performance measures can succinctly be defined as a measure (directly or indirectly) based on the elements of *performance behaviours* and *outcomes*. Austin and Vallinova (1992) further contended that the elements involved in performance measures should make it possible to make predictions about the performance of individuals for the benefit of organisational growth. Pierce (1994) and Liu and Walker (1998) are in agreement with this concept and contend that performance measures should consist of deliverable outputs supported by behavioural abilities.

In the construction industry, an appropriate definition of performance measures (i.e. in the HRM context) also remains contestable (Brown and Adams, 2000; Dainty et al, 2003; Ahadzie

et al, 2005a). While traditionally, performance measures have been conceptualised based on the output-based measures of time, cost and quality (see for instance Russell et al, 1997; Brown and Adams, 2000), recently researchers have argued that a more appropriate conceptualisation should reflect behavioural competencies (see for example Dullaimi and Langord, 1999; Dainty et al, 2003; 2004). The proponents of this emerging concept (i.e. those supporting behavioural competencies) contend that performance measures founded on key behavioural attributes are more rigorous in the sense that, they offer a better opportunity for PMs to engage in continuous performance improvement. Furthermore, they (see in particular Dainty et al, 2003) argue that a definition based on behavioural measures is concurrent with the contemporary ideology in the HRM field, which is to engender employees' professional development for best practice improvement (see also Dainty et al, 2004).

Accordingly, the established view amongst construction management researchers presently is that, PMs' performance measures can implicitly be defined in one of two ways: that is, either to conceptualise based on output-based measures or alternatively, to conceptualise based on behavioural measures. Certainly, the two established concepts as identified above are valid for defining performance measures depending on which reference point one is arguing from (see Brown and Adams, 2000; Dainty et al, 2003), however to define each concept independently

as it currently appears in construction management practice does not reflect the mutual perspective overtly recommended by, for instance, Austin and Vallinova (1992). Thus, PMs' performance measures conceptualised solely on one definition or another fails to capture the performance domain from a broader perspective and hence are not holistic (Liu and Walker, 1998; Cheng et al, 2003).

Again, while researchers concur that there is the need for performance measures of PMs to engender continuous performance improvement, no attempt has been made to explicitly link the definition to the various distinct phases that exist within project lifecycles (Ahadzie et al, 2005a). This is against the background of recent evidences to the effect that, different factors (e.g. those relating to management support and personality factors) significantly affects project success and might therefore be influencing the PMs skills and capabilities at the various phases of the project lifecycle (see Lim and Mohammed, 1999; Morris et al, 2000; Belout and Gavreau, 2004). This evidence has convinced some construction management researchers to recently argue for a much broader definition that reflects the performance of PMs throughout the whole life cycle of a project (Ahadzie et al, 2006a)

Subsequently, drawing from the generic definition provided by Austin and Vallinova (1992), it is contended that performance measures in construction human resource management (CHRM),

should appropriately and explicitly be redefined as measures based on *performance behaviours* and *outcomes*. Furthermore, the behavioural measures should be linked to the various phases of the project lifecycle. These would then be potentially useful for predicting and providing continuous feedback to PMs at various organizational levels and/or phases of the project lifecycle (Ahadzie et al, 2006a). By introducing the concepts of organisational levels and/or project phases and by reflecting the key tenets of contemporary HRM research, it is contended that this definition is useful in conceptualising the performance of PMs from a more holistic and/or multi-dimensional perspective (Ahadzie et al, 2005a; 2006a).

2.1.2 The Significance of Performance Measures in HRM Practices

As shown through the chronology of the various definitions provided above, the practical significance of performance measures in the HRM genre has been recognised since management research started in the early part of the 20th century. Indeed, research and development of the relationship between managerial work and performance measures has been the subject of systematic HRM research since Henri Fayol published his work on industrial and general administration in 1916 (Borman and Brush, 1993). Since then, several published works have attempted to address the issue of the constructs of the managerial performance domain in various ways and it is now generally

acknowledged that the trend is set to continue (Conway, 2000; Garavan et al, 2000).

Performance measures represent a key process for managers who want to enhance or maintain organizational effectiveness as it is their actions that, by and large, affect the use of organizational resources (Latham et al, 1979; Abraham et al, 2001). Furthermore, performance measures are often the only potential means for evaluating the theories of work behaviour; the effective administration of human resources and the provision of feedback to management personnel (Austin and Villanova, 1992; Hayes et al, 2000; Woerkom et al, 2002; Gibb, 2003). Thus, performance measures are essential for providing organizations the basis for planning management succession and development at the workplace (Tett et al, 2002; Ford, 2004). To this effect, performance measures represent the most important human resource scheme insofar as they represent critical decisions integral to a variety of human resource actions and outcomes (see Cawley et al, 1998; Gibb, 2003; Scullen et al, 2003).

In recent times, there has been renewed interest in research into the development of performance measures as the only viable option for validating effective managerial performance (see e.g. Conway, 2000; Tett et al, 2000; Abraham, 2001; Scullen et al, 2003). This research agenda is being driven by the changing structure of organizations due to increasingly sophisticated

technological, economic and demographic trends (Gibb, 2003; Lepine, 2003). Advances in globalisation and communication technologies have provided impetus for increased technological transfer which has also made products more stakeholder/customer focussed. Thus, organisations are being forced to innovate to remain competitive by largely structuring work activities around teams rather than individuals (ibid). To enhance and maintain the competitive edge, successful organizations are therefore relying on their managers and other key human resource personnel acquiring a range of skills through the development of appropriate performance measures (Brophy and Kiely, 2002).

Similarly, in most project-based industries such as construction, it is becoming increasingly important for organizations to proactively manage the performance of key management personnel towards the desired growth and direction of competitive advantage (see Dainty et al, 2004; 2005). Equally, there is an increasing acknowledgement that performance measures can be used to underpin the management profiles and development functions of PMs (see Cheng et al, 2005). This acknowledgement of the centrality of performance measures towards the professional development of PMs reflects a concurrent focus within the HRM field on the integration of employee improvement mechanisms into organizational strategy (Dainty et al, 2003). In effect, it is now also well-recognised within construction management practice that performance measures are an established recourse to help refocus

PMs on what it takes to achieve managerial excellence in a modern competitive work environment.

2.1.3 Development of Predictive Models and the Implication for PMs Performance Measures in Developing Countries

Performance measures are also of significance potential value in HRM for prediction purposes (Austin and Vallinova, 1992: Gellatly and Irving, 2001). This is because managers in particular are constantly in search for information that can help them make prompt decisions concerning the present and future management of projects (ibid). Subsequently, in trying to identify the performance profile of managers, researchers now tend to focus attention on developing the predictive power associated with the measures involved (Gellatly and Irving, 2001). Indeed, Dainty et al (2005), for example, re-inforces the notion that, the development of predictive models is of potential significant value in the identification of robust performance measures. Mirable (1997) also noted that performance modelling is by far the most reasonable approach towards developing job profiles and in assessing an employee's level of competency. Thus, insofar as predictive models can serve as a foundation for the selection and development of the related measures targeted to the future development of managers, their predictive power cannot be taken for granted (see for instance Tett et al, 2000: Gelatly and Irving, 2001). This largely

explains why researchers in the HRM domain have become increasingly committed towards identifying the relevant performance measures by focussing on appropriate predictive modelling across industries, sectors and various organizational levels (Tett et al, 2000; Conway, 2000; Dainty et al, 2005).

While the foregoing suggests that performance measures (including their associated predictive characteristics) are beneficial in supporting organizations in their HRM activities, their potential significance are yet to be reflected in the construction industry of many developing countries (see for instance Wachiru, 2000). Despite representing one of the largest sphere of influence, the construction industry in developing countries has historically adopted a passive approach towards satisfying the professional needs of the key management personnel employed in that domain (Ibid). Interestingly, this inertia is manifested against the backdrop that the problems affecting the managerial skills of project teams are often largely related to their competencies (see e.g. Imbert, 1990; Teeraegtul and Charoenngam, 2004; Rwelamila, 2007). Granted that effective HRM is of strategic importance to all organisations, especially in respect to creating and sustaining competitive edge (see Huemann, et al, 2007), there is the need for the construction industry of developing countries to recognise the rewards to be gained in developing an understanding of the human resource

(HR) dynamics in project oriented companies and sectors within the industry.

2.1.4 An Overview of Project Management Practices in Developing Countries

The implementation of construction projects in developing countries presents some of the most challenging arenas within which to apply effective project management techniques (El-Saaba, 2001). In reality, these projects tend to be characterised by crisis, uncertainty and suspense which warrants a test of ability on the performance of PMs in coordinating and controlling a diverse selection of functional specialist (ibid). Therefore, apart from their technical knowledge and expertise, PMs are encouraged to demonstrate a whole range of behavioural skills that can help engender effective multiorganizational teamwork and communication towards achieving successful project outcome (Faniran et al, 2000; El-Saaba, 2001). The identification, assessment and maintenance of behavioural competencies could therefore be fundamental towards the optimization of the performance of contemporary PMs in developing countries (Trejo et al, 2002).

Indeed, project management as a profession and area of research continues to expand and develop in many developing countries (see for instance Kartam et al, 2000). There is also a growing

awareness that effective project management practices provide a potentially rigorous concept towards improving project performance (see for example Strucklenbruck and Zomorrodian, 1997; Kuruoglu and Ergen, 2000; Abassi and Al-Mharmah, 2000). However, while project management competence (i.e. measuring success in terms of, for example, the iron triangle) is fundamental to effective project performance, it should also be recognised that it is PMs who deliver projects and not processes and systems (Cooke-Davies, 2002). Thus, the effective performance of the PM is a critical factor towards understanding and improving the related managerial practices required (Goodwin, 1993). However, granted that project management practices differ across areas, industries and sectors (Crawford, 2006), any attempt towards understanding the PMs' performance domain has to be undertaken in tandem with the intricate and complex social, political and cultural interactions prevailing (Abassi & Al-Mharmah, 2000; Faniran et al, 2000; Kartam et al, 2000). Thus, while project management competence should be supported, PMs' performance measures would be significant to help identify, adapt and implement best practices towards responding effectively to the unique challenges prevailing in construction environment in developing countries. Furthermore, PMs' performance measures are capable of providing both a predictive and consultative system which has the potential for engendering the professional development of PMs. Thus, to this end, PMs' performance measures in the construction industry of developing countries could provide basis for many

HRM functions, such as developing management expertise, maintaining management succession and retaining skills of key managerial performers (see for instance Rwelamila, 2007; Plessis, 2007)

2.1.5 Towards identifying Performance Measures for PMs in Mass House Building Projects in Developing Countries

Mass house building projects (MHBP) represent the largest and most established project-based sectors in many developing countries by virtue of the contribution they make to construction GDP. It is therefore not surprising that the management of these projects often attracts the largest concentration of human resource personnel in the construction industry (see for instance Wells, 1999; Zawdie and Langford, 2000; Wells, 2007). Indeed, the diverse work activities involved also attract huge socio-economic interest across all boundaries of the social divide (see Keivani and Werna, 2001). To this end, effective project management has become one of the most demanding roles that PMs have to face towards achieving project success in these projects. However, the relatively weak technological, socio-economic and organizational set ups in many developing countries poses unique and fundamental challenges for aspiring and experienced PMs (see Ofori, 1989; Keivani and Werna, 2001; Abbasi et al, 2000; Faniran et al, 2000).

Paradoxically, PMs engaged in the management of these projects also lack the benefit of any systematic criteria which can help them achieve excellence in the relatively unique and difficult environment that they operate. Identification of appropriate performance measures could therefore initiate an important step in the development of improved HRM approaches in the sector towards helping to address effective project management practices on future housing supply. While the possibility exists for the potential rewards to be realised, there is the need for the conceptual and methodological taxonomies to be earnestly developed in pursuit of appropriate evaluative criteria (Ahadzie et al, 2005b). This research is therefore founded on the contention that if the significance of performance measures is to be relevant in the construction industry in developing countries, then the underlying criteria that would help PMs reflect positively on their personal development in MHBPs needs to be identified. Thus, this research views the emphasis on MHBPs as a potentially significant foundation for initiating and contributing towards HRM performance improvement research agenda for the construction industry in developing countries (Ahadzie et al, 2004).

Following from the foregoing, it was therefore considered imperative to have a deeper understanding of existing performance measurement frameworks in the HRM genre so that an appropriate theoretical perspective can be adopted for

achieving the objectives of this research. A review of such frameworks is therefore further provided. However as a priori, the need to establish a definition of the PM in the context of this research is first addressed in the following section.

2.2 TOWARDS DEVELOPING A DEFINITION OF THE PROJECT MANAGER

While the centrality of the critical role of PMs is widely recognised in the construction industry, it is interesting to note that the interpretation of the title itself is often far from agreement (see for instance Brinberg, 1999). In some instances the term has been used to describe persons/entities that monitor, oversee and/or provide broad supervision on projects (Lock, 1987). Some researchers have also attempted to provide an alternative understanding by distinguishing the roles of the PM from that of say a project coordinator. However, the same researchers have acknowledged that the distinction can be very thin depending on the roles assigned and prevailing (see for instance Odusami et al, 2003). More recently, Jha (2006a; 2006b) also attempted to provide some further insight and reported that generally the term PM, project coordinator, construction manager, project administrator and project controller are often used interchangeably.

While this debate may continue for some time, one critical issue that cannot be overlooked is the suggestion that the title should be used for one who exercises total authority and also accepts full responsibility for the management of projects (Lock, 1987). Equally, Walker (2002) contends that it is important to focus on what the PM does rather than what should be the precise definition or title, as this holds the key to achieving project objectives. Walker (Ibid) further argues that if there should be any definition at all, such a definition should uphold the principles of project management, which is to consider the interests of the client as a priority. However, given that stakeholder interest is gradually replacing the traditional client focus, PMs are faced with not only the traditional single client but also “multiple clients” whose diverse interests also have to be satisfied (see Newcombe, 2003).

The appropriate professional background of the PM also remains a debatable subject. According to the CIOB (2002), the PM could come from any professional background but would also need to have the requisite skills and competence to manage all aspects of projects from conception to completion. Ogunlana et al (2002) have also noted that while the PM could come from any background, generally the consensus is the need to possess some degree of technical skills relating to the project at hand. Alternatively, Odusami et al (2003) contends that any construction

related professional could be a PM provided a good overall knowledge and experience of the industry is demonstrated.

Presently, what is apparent is that whatever their professional background and the roles assigned, PMs could be part of an in-house team, a consultant or contracting organization (see Figure 2.1). Furthermore, whatever the background, the PM will be expected to work with people from varied professions. Thus, the human factor including the associated managerial competencies is crucial and decisive if the PM is to deal effectively with the numerous competing interests involved (EL-Saaba, 2001; Cooke-Davies, 2002).

Generally, MHBPs differ from many of the one-off projects often encountered in the construction industry in many ways (see chapter three, section 3.3 for details). For instance, unlike the traditional one-off projects, MHBPs are often speculative in nature. “Speculative” is used in the sense that the acquisition of land, design of house-units and construction are made without reference to any specific customer and/or client in mind (see for instance Roy and Cochrane, 1999). Subsequently, unlike many one-off projects, the responsibility for the management of the design and construction of these projects often lie with a single organisation – the property developer or homebuilder (see for instance Masterman, 1992).

Indeed in Ghana, the practice in the house building industry is for the PM to be appointed at an early stage to provide key management decisions throughout the project lifecycle (i.e. to provide some advice on the decision to build, help acquire the land including associated feasibility studies, identify appropriate procurement routes, supervise and manage physical construction till completion and provide the necessary advice on facilities management) (Ahadzie et al, 2004). As such, in the context of this research, the PM is defined as the individual that has the authority and responsibility for the management of MHBPs from inception to completion and who works in the interest of the key stakeholder (herein identified as the property developer). An appropriate organisational structure reflecting the PMs' role in MHBPs in Ghana is presented later in chapter three (see Figure 3.7).

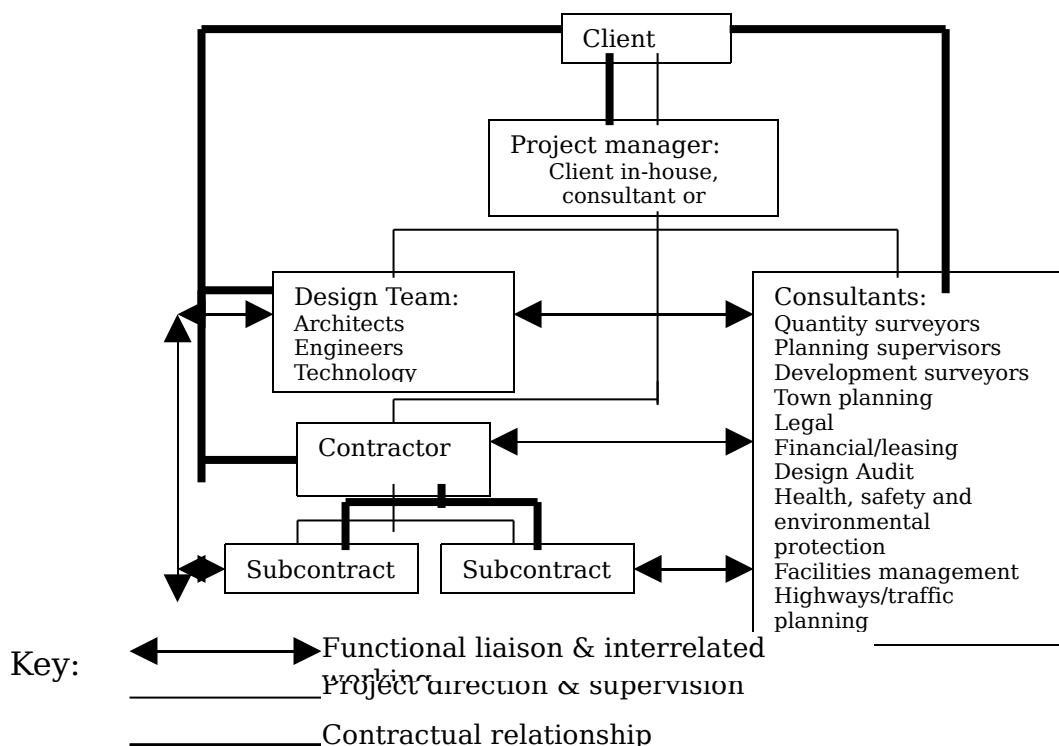


Figure 2.1: Typical project structure involving the project manager

Source: After CIOB (2002)

As noted by Goodwin (1993), the fundamental concept of project management is that a single individual (in this case the PM) is accountable for the success of a project (see also Jiang et al, 1998). That is, by being responsible for the implementation of MHBPs from inception to completion, PMs in the Ghanaian context are deemed to be held accountable for the success of these projects throughout their lifecycle. This notwithstanding, it is also noted that albeit being accountable for the successful outcome of projects, the effectiveness of the PM is only one of many factors that impinge on the outcome of projects (see Goodwin, 1993: Dainty et al, 2003). Yet, the effectiveness of the PM constitutes a critical parameter among the many variables that may directly or indirectly affect the outcome of projects (Goodwin, 1993). It is for this reason that, it is of crucial importance that the skills required by PMs are clearly understood by key stakeholders in construction organisations and those aspiring to be PMs (ibid). To this end, the objective of this study is to focus on the variables that are within the control of PMs and which have the potential of improving their own effectiveness in MHBPs. This demands background knowledge and understanding of the methodologies for measuring the performance of PMs which are addressed in the next section.

2.3 MEASURING THE PERFORMANCE OF PROJECT MANAGERS

This section considers the methodologies for measuring the performance of PMs and is grouped into three sub-sections. The first sub-section discusses traditional-based approaches for assessing the performance of PMs including the associated governing variables. This is followed by an evaluation of recent developments in regard the application of contemporary methodologies, namely, personality-based approaches. Thereafter, the third sub-section discusses the emergence of competency-based approaches and how contemporary researchers have come to acknowledge these as the most appropriate option for engendering managerial excellence.

2.3.1 Traditional-Based Approaches

Traditionally, the evaluation of the performance of PMs has been conceptualised and operationalised based on the iron triangle of cost, time and quality (Latham et al, 1979; Russell et al, 1996). However, in recent years, criticisms have come up against these traditional measures with regard to their suitability for engendering effective managerial practices. The limitations have been well documented by a number of authors (see e.g. Latham et al, 1979; Dullaimi and Langford, 1999; Dainty et al, 2003; Bassioni et al, 2004). The key problem lies in the fact that, these traditional-based approaches only provide lagging information in the sense

that the outcomes of managerial actions/decisions only become available at project completion (Bassioni et al, 2004). The irony is that PMs would rather prefer prompt feedback on their performance so that appropriate changes can be enacted on their current and future projects. These traditional measures also provide further limitations because they are influenced by factors outside the control of PMs. As a result, they are unable to isolate the contribution of PMs from extraneous influences including that of other team members. This makes it significantly difficult for them (PMs) to make any credible assessment towards their own personal development (Dainty et al, 2003; Cheng et al, 2005).

Indeed, what makes these traditional measures very appealing is that they are relatively objective and easy to determine (Latham et al, 1979). However, the consensus points to the fact that they are often in conflict with the larger corporate objectives and ethics especially when it comes to achieving cost targets; they contain elements beyond the control of the PM; they frequently make accountability of the PM redundant; and most importantly they do not tell the PM what it is that they are actually doing that is effective or ineffective (Ibid). Subsequently, Latham et al (1979) concluded that, these output related approaches are particularly troublesome for defining, developing and/or maintaining managerial excellence. In recent times, new and emerging criteria such as client satisfaction, project participant satisfaction, health and safety, environmental friendliness and risk containment have

been integrated into the commonly known traditional variables (see for instance Kumarsawamy and Thorpe 1996: Ling, 2004). However, recent findings from the from mainstream project management literature suggests that the introduction of these new and emerging criteria (listed above) has not helped in addressing the key shortcomings of the traditional - based approaches, because they are still used for assessment at project completion (Ahadzie et al, 2006c).

2.3.2 Personality-Based Approaches

Personality is the set of traits within individuals that influences their interactions and adaptation to the physical and social environment (Larsson and Buss, 2005). Personality-based approaches are therefore conceptualised and operationalised based on the trait descriptive taxonomies of PMs (see for instance El-Saaba, 2002). Typical examples of such trait-like characteristics are extroversion, impulsiveness, introversion, initiative, urgency and leadership (Tett et al, 2000). Many personality psychologists hypothesise that personality traits are relatively stable and enduring over time (see Larsson and Buss, 2005) and, this is what makes personality-based approaches potentially useful for predictions (ibid). However, while personality-based approaches have a long history for prediction and can also help engender continuous performance improvement, it is only in the relatively recent times that they have seriously been considered for

measuring the performance of PMs in the construction industry (see for instance El-Saaba, 2001; Ogunlana, et al, 2002; Odusami et al, 2003).

The problem with personality-based approaches are that, because they are founded on a persons traits, they often cause confusion and misunderstanding at the work place as superiors, peers and subordinates frequently interpret them differently (Latham et al, 1979; Tett et al, 2000). For example, leadership could be interpreted by one group to mean: motivating others, team building and worker concern whilst for another group it may mean motivating others, directing and strategic planning (Tett et al, 2000). Furthermore, because personality traits are often genetically inherited, they are not readily amenable to change and hence not suitable for developing training requirements (Croft, 1996). Thus, whilst personality traits are useful for predicting human performance (in that they help describe how individuals differ from each other), they are largely limited for developing programmes for training purposes (Croft, 1996; Dullaimi et al, 1999; Tett et al, 2000). Against the background that the aim of training and development is to change behaviours at the workplace (Cowling and Mialer cited in Olomolaiye and Egbu, 2004) it sounds plausible to reckon that personality-based approaches are not robustly useful as tools for engendering the continuing professional development of PMs.

2.3.3 Competency-Based Approaches

Generally, there is some confusion over the use of the term competency in construction management research. It is therefore important to put the meaning of the term in context before addressing the relevance of competency-based approaches.

2.3.3.1 A definition for competency

Cheng et al (2003) have identified two interpretations in the use of the term “competency” stemming from the US and UK explanations. The predominant US interpretation defines competency as the underlying attributes of a person - largely an input-based methodology. In contrast, the UK interpretation sees competency as a set of performances and standards often linked to output-based measures (i.e. competence). An extant review of literature by Brophy and Kiely (2002) also revealed three main positions taken towards the definition of the terminology. That is, competency relates to: observable performance; the standard or quality of the outcome of the person’s performance; the underlying attributes of the person. To this effect, it is common to find in the literature that the terms competency and competence are often used indiscriminately as synonyms (Dainty et al, 2004). In the opinion of Cheng et al (2003), the divergent interpretations adopted by the US and UK has largely led to confusion in the definition of the terminology.

Nevertheless, following the increasing attention that competency-based approaches are gradually receiving in construction management research, it is now becoming clear and accepted that competency is best used to describe input-based measures (underlined by behavioural metrics) rather than an externally or output-based measure (Dainty et al, 2004). There is therefore now a general acknowledgement by HRM researchers that, the term competency should be defined as a person related concept that refers to the dimensions of behavioural action (and underlying competent performance) as against competence which is a concept related to some output-based measures (ibid).

Therefore, in the context of this study, competency when used is interpreted as: *“an identifiable aspect of prospective work behaviour attributable to the individual that is expected to contribute positively and/or negatively to organisational effectiveness.”* (Tett et al, 2000)

Recently, Crawford (2005) has furthered construction management researchers understanding of the terminology by providing three interesting classifications, namely; input competencies, personal competencies and output competencies. Input competencies as defined by Crawford refer to the knowledge and skills that a person brings to a job. Personal competencies relate to the core

attributes underlying a person's capability to execute a job. Alternatively, output competencies are identified as the "demonstratable" performance that a person exhibits at the job place. In Crawford's (2005) view the overall contribution of these competencies is important towards achieving competence.

2.3.3.2 Relevance of competency-based approaches

Currently the consensus among HRM researchers including those in the construction management discipline is that competency-based approaches are emerging as the rational basis for an integrated human resources policy towards organisational development (Hayes et al, 2000). To this effect, the IPMA website, for instance, states that *"competency models have become a dramatic recourse in refocusing people on what it takes to succeed in today's workplace environment."*(cited in Brophy and Kiely, 2002)

Competency-based approaches are becoming increasingly important in HRM practices because they circumvent many of the problems of the traditional techniques including facilitation and identification of the appropriate measures towards achieving a useful accurate prediction (Dainty et al, 2003; 2004). Unlike functional competences, competency-based approaches can assist PMs to contribute more effectively to their personal development

by enabling understanding of effective performance requirements of the task required (Cheng et al, 2005).

It is therefore not surprising that the research agenda in the construction management research genre is increasingly being channelled towards developing appropriate competencies and competency modelling (see for example Dullaimi and Langford, 1999; Dainty et al 2004; 2005; Skipper, 2006). That is, identification of an appropriate competency-based predictive model now represents an established alternative towards helping PMs to focus on what will make them effective towards achieving their professional goals (Cheng et al, 2003; 2005). Moreover, competency-based models acknowledge the centrality of the development of PMs towards the achievement of strategic business objectives and so conform more comfortably with the tenets of HRM orthodoxy (Dainty et al, 2003).

Thus, whilst various approaches are available for identifying and developing performance measures of PMs, what is emerging is that, to help enhance the PMs own professional development, competency-based approaches offers a more potentially useful methodology because they deal with behavioural measures that are within the control of the PMs (Tett et al, 2000; Dainty et al, 2003; Fraser and Zakrada-Fraser, 2003). Given that the performance measures being explored in this research context are those within the control of PMs, it was therefore decided to further

explore the strategic importance of competency-based approaches towards identifying an appropriate theoretical perspective for the study.

2.4 THE STRATEGIC IMPORTANCE OF COMPETENCY-BASED APPROACHES

As noted above, a key premise of competency-based approaches is that, performance is essentially the degree to which PMs through their behavioural competencies can help organizations reach their intended goals. Thus, in this context, the PMs' performance is seen essentially as behaviour with an evaluative component (Campbell 1983; McCloy et al, 1994; Borman et al, 1997). In the light of the apparent weaknesses of the two previous methodologies, it appears that competency-based approaches have strategically emerged pivotal towards improving HRM practices largely because:

- They focus primarily on what PMs do that makes them successful or not. Subsequently, they have significantly more potential for helping PMs to establish what makes them effective and/or ineffective and also accountable for their actions (Latham et al, 1979).

- They provide the psychological understanding needed for selecting and predicting human performance (Motowidlo et al, 1997).
- They resonate with the potential expectation of PMs and have been shown to maximise developmental efficacy (Offermann et al, 2004)
- There is the potential for achieving genuine economic value for firms hence the increasingly important recognition in their use in the examination of managerial effectiveness (Spencer, 2001; Dainty et al, 2005)
- Above all, they are amenable for developing more realistic and practical training requirements

Thus, unlike functional competences, which measure performance against only output based-measures, competency –based approaches reflect a cyclical and continuous process of assessing, planning and taking corrective action on the performance of PMs (Dainty et al, 2004).

Thus, while personality traits can also be used to predict the performance of PMs, the scientific usefulness of using behavioural competencies as operational measures is that these make it possible to understand the underlying dispositions involved

towards PMs' professional development (Borman and Motowidlo, 1993; Larsson and Buss, 2005). This is because competencies more than general traits are more likely to be expected to be amenable to change, for example through training (Tett et al, 2000). That is, behavioural competencies can be thought and learned rather than inherent characteristics such as traits (Skipper et al, 2006). Put emphatically, a person's personality cannot be changed, but, the behavioural action resulting from the trait can be changed by the person being made aware of them through training (Croft, 1996).

In effect, it appears that, because of their ability to facilitate the development of training requirements competency-based approaches would be expected to provide a better opportunity for initiating staff training programmes, the development of comprehensive job descriptions; facilitate decision-making regarding manpower planning and staffing; and can be very useful for goal setting (Latham et al, 1979; Pickett, 1998; Dainty et al, 2003; 2004). Therefore, competency-based approaches present a *prima facie* case for utilizing and developing the potential of PMs in order to enhance their competitive capabilities. In this perspective, it could therefore be argued that, organisations that use competency-based systems for assessing the performance of their managers are visionary of high performance achievers (Abraham et al 2001).

Thus, for organizations who are keen to support the professional development of their key management personnel, the implication is that they define effective managerial performance in explicit behavioural terms, that is, in terms of the observable episodes that make managers successful (Latham et al, 1979; Gibb, 2003). Subsequently, the onus for project organizations who want to achieve best practice in their key professional staff is to create an enabling environment for them to aspire and contribute towards improving their personal skills (Heffenman and Flood, 2000; Brophy and Kiely, 2002). These underlying attributes in respect to helping PMs in their personal skills development place competency-based approaches above the other two methodologies as a core strategic HRM activity (Hayes et al, 2000; Garavan et al, 2000; Tett et al, 2000 Garavan et al, 2002).

2.5 EMERGING STUDIES ON PMs BEHAVIOURAL COMPETENCIES

While competency-based approaches are gradually gaining prominence in construction project management practice and research, the evidences suggest that the knowledge base is still in its infancy and would require much further studies (Fraser and Zakrada-Fraser, 2003; Crawford, 2005). Indeed, in the construction industry, the genesis of a concerted research agenda towards improving PMs' competency appears relatively young (see e.g. the work done by Mustapha and Naoum, 1998). Thereafter,

other relative studies such as those by Fraser (1999), Fraser (2000) and Edum-Fotwe and McCaffer, (2000) have also been acknowledged in the literature. The findings of these studies (among others) provided useful foundation towards appreciating the significance of personal characteristics in PMs' effectiveness. Notwithstanding the significance of the studies however, the findings failed to provide an empirical understanding of the competencies identified with respect to, for instance, the various dimensions of competencies identified by Crwaford (2005). Interestingly, Boyatzis (1997) has also noted that for a more in-depth understanding of behavioural competencies, there is the need to distinguish between any potential competency type and levels of competencies.

Furthermore, while researchers agree that, where possible, the use of "theories¹" provide a more rigorous approach towards understanding and advancing project management knowledge (see Soderland, 2004; Judgev, 2004), these studies were largely based on general guidelines from the literature (see for instance Fraser, 2000) or what Judgev (2004) describes as "practitioner-driven normative approaches". That is, while the findings of the studies herein cited were indeed informed and supported by mainstream project management literature, no evidenced-based practice theory/model was advanced towards validating the conceptual and empirical bases of the research design. This limitation in the lack

¹ Theory as used here means an empirically proven proposition that reasonably explains the inherent characteristics of a phenomenon and has the potential for ascertaining wrong predictions (See Judgev, 2004)

of a theory potentially limits the theoretical understanding of the variables used, especially given the inherently complex nature of behavioural measures (Liu and Walker, 1998; Garavan et al, 2003; Scullen et al, 2003).

Other contemporary studies worth noting here are those attributed to Dullaimi and Langford (1999), Dainty et al, (2003; 2004; 2005), Fraser and Zakrada-Fraser (2003), Cheng et al (2005) and Skipper et al (2006). Perspectively, going by the classifications of competencies provided by Crawford (2005), these studies (cited just above) also suffer from the limitations outlined previously. On a more positive note however, these studies made some inroads by advancing some form of theory towards validating the conceptual and empirical bases of their research design. For instance, Dulaimi and Langford², (1999) employed the contingency model of leadership proposed by Fiedler (1967) as the basis for developing the research instrument for their study. Dainty et al (2003; 2004; 2005) and Cheng et al (2005) also utilised the well-established Mcber job competency assessment process initially developed for industrial psychology by McClelland (1973). Alternatively, Fraser and Zakrada-Fraser (2003) relied on the stakeholder theory, which posits that sustainable success rests, to a great extent, with the systematic consideration of the needs and goals of all key stakeholders. Skipper et al³ (2006) also relied on

² In the context of this study the theory was also limited in scope as it was used for only leadership behaviours

³ In the context of this study the theory was also limited in scope as it was used for only leadership behaviours

what they termed the well-acclaimed Leadership Practices Inventory (LPI) developed by Kouzes and Posner, (2002).

Notwithstanding, the use of evidence-based practice theories by these researchers (just cited above) however, the way the theories were advanced and implemented in suffice to suggest that they might not be particularly useful for explicitly isolating and explaining the managerial performance domain as, for instance, evidenced by the various labels of competencies identified. To this effect, further discussion on the limitation of these papers is provided in section 2.6 in an effort towards identifying an appropriate competency-based framework for addressing the research objectives.

In the interim, it is also important to recognise the study by Crawford (2005) part of which has already been introduced on establishing an appropriate definition of competency. While proposing the various classifications of competency, Crawford (2005) treated the ideology as a concept and failed to provide an empirical validation. It is therefore not overtly clear from the empirical analysis undertaken by Crawford, how the various variables might uniquely be contributing to the various competencies. Additionally, the empirical findings (while informed and supported by project management literature) were not specifically and explicitly supported by any established theory (see also Seng and Skitmore, 2004).

Furthermore, it is to be recognised that project management practice differs across geographical regions and applications areas (Crawford, 2005). Thus, while there are indeed some useful lessons to be learnt from the literature cited, it is evident that they are not particularly appropriate for the situation in developing countries as they are largely based on conditions prevailing in developed economies such the UK, the US and Australia. There is therefore the need for project-based organisations in the construction industry in developing countries to also strive towards establishing the appropriate measures, which are in tandem with their technological, socio-economic, structural and cultural practices.

However, in demand to the inherently complex nature of construction projects, particularly, in an increasingly difficult and unpredictable work environment such as those pertaining in many developing countries, the behavioural competencies of PMs are likely to be more complex and diverse than in most other industries. Subsequently, the view of the author was that, project-based sectors of the construction industry in developing countries may require a methodology (in particular supported by an evidenced-based practice theory) that would offer a much more detailed analysis and understanding of the complex behavioural variables likely to be involved.

2.6 IDENTIFYING AN APPROPRIATE COMPETENCY-BASED FRAMEWORK

The problem with behavioural competencies is that while they are important, they are also dynamic and difficult to identify (Fowler, 2000). What is more, identification of an appropriate competency-framework is ongoing and the most effective methodology is yet to emerge (see for example Borman and Brush, 1993; Conway, 2000; Jones and Connolly, 2001; Cheng et al, 2003). Generally, it remains unclear whether in practice it is possible to distinguish between the development of generic and specific competency profiles for specific industries and/or sectors (Brophy and Kiely, 2002). However, the fact that these measures are complex and dynamic does not mean the key variables involved cannot be isolated (Tett et al, 2000). To this effect, not recognising and embedding these behavioural measures in organizational programmes can have a detrimental impact on the potential growth and competitiveness of PMs (Cheng et al, 2005).

The foregoing has demonstrated that, where possible, researchers in construction management currently draw on existing frameworks from the HRM genre to facilitate the development of appropriate competency models. While there may be many potential theoretical perspectives (such as economic and general management) to addressing competency modelling, Garavan et al (2000) have noted that these theories most often fit into at least one theoretical perspective and that is, the psychological domain.

That is, behavioural competencies as evidenced in mainstream HRM publications, is rooted in psychological constructs (Liu and Walker, 1998). It could therefore be argued that, a positive aspect of the frameworks adopted in the studies previously highlighted in section 2.5 is that, as they are all psychologically driven, they fit in well with the tenets of contemporary human resource development (HRD) research. Subsequently, while they offer convenient opportunity in the ability to identify and appreciate appropriate behavioural competencies, they also provide basis for legitimizing the relevance of existing and emerging theories in construction HRM research.

However, from an industrial and organizational psychology perspective, these frameworks are also limited in a number of ways. For instance, and as argued in the preceeding section, their implementation suggests they might not be explicitly amenable for investigating behavioural measures from a multidimensional perspective. This is against the backdrop that behavioural measures are complex and numerate and grouping them together produces a psychological intractable hodgepodge (Motowidlo et al, 1997; Conway, 1999; Gelatly and Irving, 2001; Scullen et al, 2003). For any specific job there are also substantive behaviours that are distinguishable in terms of their correlation and patterns of covariation with other variables (McCloy et al, 1994). Against the backdrop that the use of theories currently has an under-recognised and, yet important role to play in academic discipline

and practice of HRM programmes (Garavan et al, 2000), there is therefore scope for a methodology, underlined by appropriate and tested theoretical constructs that can also enable an empirical understanding and validity of any existing potential labels of competencies from a multidimensional perspective.

Drawing from organisational psychology literature, an evidence-based practice theory that has been argued for having the potential of measuring the PMs' performance from a multidimensional perspective was therefore explored for potential application in this research (see Ahadzie et al 2006b). The theory posits that a robust way of understanding the domain of managerial performances is to separate the competencies into *contextual* and *task performance behaviours* (Borman and Motowildo, 1993; Motowildo et al, 1997; Scullen et al, 2003). While *task performance behaviours* are job-specific and formally recognised and/or rewarded such as the managers job description, *contextual performance behaviours* refers to those discretionary job-related acts such as working hard and helping others, which informally contribute to organizational effectiveness but are not formally recognised as part of the job (Motowidlo and Borman, 1997; Organ and Paine, 1999).

The main premise of the *contextual-task* distinction is that within the job environment, what makes *contextual performance behaviours* desirable or undesirable may be different from what

makes *task performance behaviours* desirable or undesirable (Motowidlo and Borman, 1997). Hence, the antecedents of *contextual performance behaviours* are likely to be different from the antecedents of *task performance behaviours* (ibid). Accordingly, the knowledge, skills and habits associated with *contextual behaviours* are likely to be different from those of *task behaviours* (Motowidlo et al, 1997). In this respect, it is also important to remind readers of Mintzberg (1980) and later Burgoyne (1989) who asserted that, while managerial jobs might be generalized at some levels in a job situation, there are differences at a detailed level of investigation (cited in Egbu, 1999; Hayes et al, 2000). This coupled with Boyatzis (1997) assertion (already mentioned above, refer page 40) suggests that any theory based methodology such as the *contextual-task* framework, which has the potential for exploring a detailed level of investigation of the PMs' performance domain should be welcomed.

Indeed, the evidence presently suggests that the *contextual-task* distinction might be more relevant for assessing and understanding managerial performance domain and is therefore worth pursuing (Conway, 1999). This is because as managers often get jobs done through others they more than other professionals need to adequately possess the relevant personal skills, which must be thoroughly unearthed (Conway, 1999; Scullen et al, 2003). It is therefore the contention that, the *contextual-task* performance

framework may be more appropriate for isolating the PMs' behavioural performance domain in this research context because:

- It gives opportunity to define the potential variables in both explicit and implicit behavioural terms;
- It portrays the performance domain as multidimensional and thus has the potential of helping to distinguish potentially specific profiles from generic profiles;
- It has been widely validated both within industrial-psychological and the human resources genre (see Tett et al 2000); and
- It has been reported as providing consistently reliable and valid findings across various job performance levels (see e.g. Borman and Brush, 1993; Gellatly and Irving, 2001; Tett et al, 2000).

Evidently, the use of theories capable of supporting studies on behavioural competencies in construction management research is still emerging (Liu and Walker, 1998). The criticisms levelled against the theories/frameworks used in the literature herein cited do not mean these theories are not useful as they provide convenient frameworks for investigating and advancing the theoretical understanding of the PMs' managerial domain.

However, based on the narrative presented, it is contended that the *contextual-task* performance framework might potentially allow for a more fine detailed analysis and understanding of managerial behaviour, its effects and measurement. Subsequently, this could help organise the performance domain into behavioural homogenous categories, which should make it possible to understand the performance domain better (Motowdlo et al, 1997). In view of this disposition (and with particular reference to the definition adopted for performance measures), the *contextual-task* typology is revisited in much detail in chapter four when the development of the conceptual model is discussed.

2.7 SUMMARY

This chapter has discussed some important generic issues regarding the significance of performance measures in HRM, especially, within the construction industry. While performance measures were described as an important contributor to improving HRM practices it is observed that this is yet to reflect in construction management practice in developing countries. Subsequently, using MHBPs as a case study, it is intended to address this imbalance by developing appropriate PMs' performance measures for that sector. It is contended that MHBPs offer an appropriate foundation for this study because of their considerable significance and the huge socio-economic interest they attract.

Consequently, a critical review of the methodologies for measuring the performance of PMs has been undertaken with a view towards adopting the most relevant approach for this research. The literature suggests that competency-based approaches are becoming increasingly accepted as the most effective for identifying the appropriate performance measures. Furthermore, it was argued that to make these competency-based measures more effective, there was the need to make them multidimensional by linking them to performance outcome and the project lifecycle.

Subsequently, an evaluation of some of the key competency frameworks adopted recently for the construction industry in particular were undertaken to help establish their potential usefulness in this respect. It is contended that the *contextual-task* performance framework, which considers the performance domain of managers to be multidimensional might be a prudent basis for this research.

In this chapter, a working definition of the PM has also been argued in the context of the research. Given that the research focuses on developing countries, the next chapter underpins the justification of research by undertaking a critical review of research and development in the management of human resources in developing countries.

CHAPTER THREE

CHAPTER THREE: A CRITICAL REVIEW OF RESEARCH AND DEVELOPMENT IN THE MANAGEMENT OF HUMAN RESOURCES IN DEVELOPING COUNTRIES

3.0 INTRODUCTION

In chapter two, the concepts and methodologies underlying the measurement of the performance of PMs in the human resource management (HRM) genre were considered. The focus of this chapter is on the HRM literature to demonstrate the general lack of research attention towards performance measurement of key management personnel in developing countries. The potential significance of PMs' performance measures in the construction industry of developing countries is discussed including the importance of such measures being able to support their personal development. Subsequently, a detailed appraisal of the significance of MHBPs (i.e. viz. PMs' performance measures) as a key project-based sector is reinforced towards cementing their strategic interest in this research context. To this end, a working definition and characteristics of MHBPs, including their implications towards the subsequent design of the research methodology is provided.

In this chapter, the study area, Ghana is also introduced. Perspectively, the significance of the construction industry is

presented including an in-depth account of recent developments in HRM practices in MHBPs.

3.1 TOWARDS IMPROVING HUMAN RESOURCE MANAGEMENT PRACTICES IN DEVELOPING COUNTRIES

Here, a critique of the performance measurement literature is presented to demonstrate the lack of research in the construction industry and specifically in context of developing countries. Subsequently, the implication and potential benefits to be derived in adopting an appropriate PMs' performance measures is argued.

3.1.1 A Review of Performance Measurement Literature for Human Resource Development in Developing Countries

Some of the notable attempts towards research and development in the management of human resources (HR) in developing countries are attributed to reseachers such as Wahab (1980), Olomolaiye et al (1987) and Parker et al (1987). Following these, Kaming et al (1997), Kaming et al (1998) and Navon and Goodman (1997) have also made inroads towards making appropriate contributions. While these earlier attempts are indeed well registered in the literature, their emphasis was on factors influencing craftmen productivity and the development of

production rates/labour output for craftsmen. While managers of construction projects could rely on these findings to potentially plan and monitor the works of their subordinates, the findings had little use for their own personal development.

During this period (1980s to 1997) the only known study which came close to addressing HR issues at the managerial level is by Enhassi (1997) which sought to improve the supervisor's site management practices in MHBPs. Nevertheless, this study fell short of addressing performance measures and therefore cannot be used to assess and predict the performance of PMs on future projects.

Quite recently however, Ogunlana et al, (2002) and Ling, (2004) have made some notable contributions by focusing specifically on HRM practices at the project management level. For instance, Ling (2004) attempted to model the factors influencing PMs' performance so that they can reflect on these factors towards improving their performance. However, the factors considered were also outside the control of PMs and could therefore not assist PMs towards improving their own personal skills.

Currently, the key study worth elaborating on in this research context is the one attributed to Ogunlana et al (2002). This study is significant here because it involved the development of a model for matching PMs onto different project categories including

residential structures. Indeed, Ogunlana et al (2002) concluded that their findings could be used in the selection of PMs for the different project types involved suggesting (albeit arguably) some element of predictability.

Notwithstanding the significance of this study, the conceptual and methodological approach adopted appears limited in various ways and thus leaves scope for a more rigorous study. For instance, in developing the matching model, Ogunlana et al (2002) elicited information simultaneously on different project categories namely commercial⁴ (33%), industrial (30%) and heavy engineering (37%)⁵ projects. However, it would seem that the operational measures used in eliciting the relevant data were generic and not particularly operationalized to reflect the uniqueness of the projects involved. Furthermore, there is an indication that the same participant (s) provided the data elicited for the different project categories. However, asking the same respondents to draw on the three categories of projects simultaneously poses serious psychological challenges because performance evaluation involves recall of information from memory and there is evidence to suggest that, the process is often associated with distortions (see for instance, Cantor and Mischel, 1979; Tsui and Ohlott, 1988). This is because in assessing performance, respondents tend to observe, encode, store and recall different information depending on their experience, and asking the same respondent(s) to draw

⁴ Residential and commercial projects were grouped as one category.

⁵ Percentage indicates the proportion that each project accounted for in the study

from varied experiences simultaneously for different project types is potentially more likely to distort the information they recall (Borman 1978). Thus, while, Ogunlana et al (2002) did advise the respondents to treat each project category independent of each other, there is some doubt that the mixed representation may make it more difficult for the respondents to recall the appropriate performance rating for the variables employed in assessing the PMs.

Above all, the variables used in developing the matching model were based on the so-called traditional and personality-based measures. However, as argued in chapter two (section 2.4.1-2.4.4), operational measures based on these approaches do not provide sufficient grounds for engendering higher performance levels of PMs. In contrast, it is recognised that competency-based measures circumvents many of the problems associated with these measures including facilitating the matching and selection of PMs and also providing more accurate predictions about suitability (Dainty et al, 2003). Thus, while Ogunlana et al (2002) maintained that the matching model can be used to select the services of the right PM for the project types involved, it is contended that the conceptual and methodological approach adopted leaves scope to construct a more rigorous performance model that can be used to match, select, predict and above all engender the PMs' continuing professional development.

The foregoing suggests that while performance measures are widely held as the only viable option for validating and engendering managerial excellence in the HRM genre, the only noteworthy work that has so far come close to addressing PMs performance measures in developing countries is the literature attributed to Ogunlana et al (2002). However, as demonstrated by the review, while the attempt is notable, the conceptual and methodological approach adopted limits the usefulness of the findings for initiating a firm foundation on which the PMs' professional development can be engendered. Thus, despite being one of the largest industries in developing countries, the construction industry is yet to adopt a more rigorous conceptual and methodological approach towards identifying appropriate PMs' performance measures

3.2 THE SIGNIFICANCE OF MASS HOUSE BUILDING PROJECTS TOWARDS IMPROVING HUMAN RESOURCE MANAGEMENT PRACTICES

The importance of the construction industry in developing countries is relatively well documented (see for instance Turin, 1973; Moavenzadah, 1978; Lopez et al, 1998; Zawdie and Langford, 2000). For instance, in most sub-Saharan African countries, the industry accounts for about 5% of the Gross Domestic Product (GDP) in relation to a corresponding average of

7% in developed countries (see Zawdie and Langford, 2000). At the pivot of this importance is the contribution of MHBPs towards the overall construction output. Barring civil engineering projects (such as roads, dams, railways), MHBPs alone accounts for about 60% of the construction GDP attributed to all building projects (i.e. including for instance schools, factories, offices and commercials) (Wells, 1986; Zawdie and Langford, 2000; Wells, 2007). This suggests that for most developing countries MHBPs make the single most important contribution to the Gross Fixed Capital Formation (GFCF). Furthermore, unlike Civil engineering works, which are largely government controlled, MHBPs are now largely private sector led and also register the largest employer of human resources (see for instance Well, 1999; UK Trade and Investment, 2004; Wells, 2007). Thus, human resources management activities in MHBPs could arguably be described as representing the foundation for developing HRM skills for many other sectors of the construction industry (see for instance Ganessan, 1983; Edmond and Miles, 1984; Wells, 1999; Wells, 2007).

The significance of MHBPs could also be deduced by the constant reference to economic indicators such as population growth rate, mortgage credit availability/supply, house-hold income and rate of household and economic growth in their implementation (see for instance Hua, 1996; Windapo et al, 2004). With an estimated one billion people or more living in inadequate housing in developing countries currently, the association of the implementation of

MHBPs to these economic indicators is becoming an increasingly debatable subject amongst housing experts, policy makers and civil society groups (see for instance Keivani and Werna, 2001). Given the socio-economic interest that the implementation of MHBPs attracts, it is not surprising that the construction processes and quality of the products have for instance been the focus of relatively good attention in construction management research (see for instance Wahab, 1980; Odenyika and Yusif, 1997; Okuwogo, 1998).

However, despite being the largest and arguably most established project-based sector, MHBPs have remained significantly under-researched and under-developed in relation to improving HRM practices through identification of appropriate performance measures and this is a reflection of the general construction climate in developing countries. The implication is that at a time when performance measures are receiving renewed attention, PMs' specializing in the management of arguably the single most significant sector in many developing countries such as Ghana are unaware of the criteria that can be used to validate their performance towards best practice improvement. Ironically, the poor management of these projects has constantly and increasingly been the subject of severe criticism from stakeholders, policy makers and civil society groups (see for instance Enhassi, 1997; Keivani and Werna, 2001). Identification of the appropriate PMs' performance measures should therefore

serve as an important step for developing the skills of potentially competent PMs, who can promote the effective management of MHBP in a relatively dynamic but increasingly difficult business environment (see for instance Ahadzie et al, 2004; Mutajwaa and Rwelamila, 2007). To this end, a working definition for MHBP is provided so that the characteristics of these projects can be incorporated into the subsequent design of the research methodology.

3.3 DEFINING MASS HOUSE BUILDING PROJECTS

While the use of the term MHBP is widely entrenched in the construction industry, extensive review of the literature revealed no comprehensive definition. Typically, the term is used in the construction industry to describe mass production techniques of housing development projects (see for instance Ashley, 1980; Dhaneskar, 2000; EL-Rayes, 2003). The tracking of this definition, which has been used by numerous researchers to date is derived from the manufacturing sector. This definition however fails to explicitly highlight such characteristics as the project environment; site conditions including topography; the weather; bulky materials; design consideration (see for instance Burgess and White, 1979; Proverbs, 1998).

In the quest for a definition encapsulating the true characteristics of the construction industry it is proposed that MHBP should be

defined for the purpose of the research as *“the design and construction of speculative standardised multiple house-units usually in the same location and at executed within the same project scheme”* (Ahadzie et al, 2006a). Such house-units could include: terrace, multi-storey or tower blocks, maisonettes, semi-detached, and/or detached residences or any combination of them.

This definition acknowledges the key concept of repetitive techniques in the production methods and also recognises the peculiar characteristics of the construction industry (Ahadzie et al, 2006c). For the purposes of this study four main points are worth noting in regard to the definition of MHBPs:

- They must be based on one or more standardized designs in the sense that the architectural design of all phases must be largely identical for the house-units. This is necessary to ensure the concept of repetition is met;
- They should involve the construction of domestic residences (whatever their form).
- They must be speculative in the sense that the acquisition of land, design of house-units and construction are made without reference to any specific customer in mind;

- They should as much as possible be located in the same area and be part of the same scheme or contract conditions.

By adopting this definition, it is also possible to distinguish MHBPs from other recently developed analogous terms such as custom-made housing projects (CMHPs) (which are often built to the specification of the purchaser) (see for instance Iwasshita, 2001) and mass custom designs (MCDs), which albeit mass produced are not strictly speculative (see for instance Noguchi et al, 2005).

Basic experience or learning curve theory suggests that each time the number of repetition doubles the cumulative production rate (manhour per unit) declines by a consistent fixed percentage of the previous cumulative production rate (Scwartzkopf (1995; Couto and Teixeria, 2005). When this theory was replicated in the construction industry using 45 identical house-units, it was confirmed that each time the house-units doubled the cumulative production rate improved by 90% (United Nations, 1965). This suggests that a minimum of two house-units is sufficient to achieve learning curve effect arising out of the repetition involved in MHBPs.

This notwithstanding, the United Nations Economic Commission for Africa had suggested that for developing countries (particularly those south of the Sahara) to meet their present and future housing needs, they should aim at an annual production rate of 10

house-units per 1000 population (Edmonds and Miles, 1984). Drawing on this and also considering the realities of the economic situation in most developing countries, the threshold for the minimum quantity of house units is fixed at an average of 10 house-units per year in this study.

3.4 THE CHARACTERISTICS OF MASS HOUSE BUILDING PROJECTS IN DEVELOPING COUNTRIES

MHBPs differ in many ways from the traditional one-off projects often encountered in the construction industry. For instance, MHBPs by their nature must be based on standardised design; there is the need to identify the stages in production at which control is to be exerted; there is the need for production time between stages including delivery schedule of house-units (see for instance Burgess and White, 1979; Muhleman et al, 1992). Generally because of their unique nature, the setting up of the production system involves two associated problems; the minimising of synchronizing loss and the maximizing of resource utilization (Muhleman et al, 1992). Moreover, depending on the quantity of house-units involved, these projects are often relatively large-scale and can stretch over a considerable production area. This coupled with the numerous interrelated skills involved makes the management of these projects inherently more difficult to manage than many one-off traditional projects (Mahdi, 2004).

Typically, MHBPs have become the natural choice for meeting large housing and speculative needs because they can lead to mass-scale delivery of house-units within the shortest possible time when well-managed (see Youngha Cho, 2003, Roy et al, 2003). However, the key to achieving project management success is for PMs to have the requisite knowledge and skills that enhance management intuition in repetitive construction planning (see Ashley, 1980; Dhaneskar, 2000; Mahdi, 2004; Yang and Chang, 2005). Management intuition in repetitive techniques as used here means that the PM should be able to introduce planning and scheduling models that:

- Will maintain continuous flow of work for all identifiable labour involved in repetitive tasks.
- Will ensure the continuous flow of all resources including their allocation and levelling
- Will achieve time and cost efficiencies by appropriate balancing of labour through the opportunity of experience and learning curve effects on production.

Acknowledging the restrictions imposed by traditional programming methods in treating this type of project, specific methods for repetitive construction have been suggested for the

last 30 years (Couto, 1998; Teixeira and Couto, 2002a Couto and Teixeira, 2005) (see also Gates and Scarpa, 1972; Thomas and Mathew, 1985 Tam et al, 2002; Mahdi, 2004). These management tools were first based on the line of balance technique (LOB) with a constant production rate, but subsequently several modifications including computer modelling have been developed. However, while these quantitative tools are useful additions, poor management (including the lack of work preparation or insufficient knowledge and skills on the part of PM) may introduce delays leading to frustration and demotivation of workers, which in turn is reflected in poor performance (Couto and Teixeira, 2005).

In many developing countries the project environment is unstable and characterised by rapidly changing markets, funding sources are regularly shifting, government policy multiply and the business environment is frequently changing (Faniran et al, 2000; Ayirebi-Dansoh, 2005). In the face of these challenges, PMs engaged on MHBPs are also expected to demonstrate reasonable skills towards effectively managing the effects of these unique characteristics. Thus, as noted by Al-Mhomani, (2000) in the implementation and management of MHBPs PMs would be expected to put in place appropriate management practices that would ensure:

- The most efficient and economical method of carrying out the work consistent with the available resources;

- A continuous productive work for all the operatives employed and reduce unproductive time to a minimum;
- Effective site organization and control of all the works by prior examination of all aspects and by early consideration of possible difficulties, ensure smooth and continuous progress at site;
- Accurate information relating to material delivery, the build up of labour force, daily or weekly financial expenditure on labour, and
- A simple and rapid method of measuring the progress that has been made and evaluation of work progress.

Note that, while in developed economies, many problems associated with these skills can be swiftly solved because of the efficient communication system and human resources development base, in many developing countries this is not that possible. Subsequently, the PM has to put in extra work so that unnecessary and inefficient practices can be avoided. Thus, in the context of developing countries, PMs are faced with providing the appropriate management structure consistent with available resources to support the economies of large-volume work that help achieve improved performance levels in the midst of these

difficulties (see Enhassi, 1997). Thus, identification of the appropriate performance measures will help to focus both potential and experienced PMs on those important management skills that can help address some of these challenges. Using Ghana as a case study it is intended to make a contribution towards achieving this.

3.5 INTRODUCING THE STUDY AREA: THE CONSTRUCTION INDUSTRY IN GHANA

Having introduced a review of HRM literature including a justification of the research in the context of developing countries, this section further underpins the literature by introducing HRM practices in the study area, Ghana. Specifically, the aim is to demonstrate the convergence of the construction climate in Ghana to the wider conditions pertaining in many other developing countries and also to explain how recent developments in PM practices in MHBPs makes it appropriate for Ghana to be adopted as a case study. A synthesis of the geographical and economic profile of Ghana is first provided followed by the socio-economic importance of the construction industry, particularly, the housing sector. Thereafter, a chronology of the evolution of HRM practices in MHBPs is discussed especially the contribution of PMs. This is then followed by a thorough critique of the criteria for assessing the performance of PMs including a discussion of how this converges with the weaknesses already identified in the wider

context. Drawing on the recent efforts in Ghana towards a better integration and understanding of the performance of PM in MHBPs, the way forward is therefore introduced.

3.5.1 The Geographical Location and Economic Profile of Ghana

Ghana is located on the West coast of Africa - Gulf of Guinea- only a few degrees north of the Equator (Figure 3.1). It has a land area of approximately 238,537 square Km and population of over 20 million (Birmingham et al, 1966; GLSS, 1995). The borders of Ghana are surrounded by Togo to the immediate right, Burkina Faso to the immediate top and the Ivory Coast to the immediate left. Furthermore, it is important to mention the strategic position of Nigeria which is a major economic player in the region (see figure 3.1).

Indeed, Nigeria and Ghana share much more in common than their immediate neighbours by virtue of being members of the commonwealth. Accordingly the construction environment in both countries is similar to what pertains in most commonwealth nations. While this geographical location places Ghana among Sub-Saharan African (SSA) countries, the socio-economic conditions are typical of what pertains in many other developing countries in South- East Asia, and North and South America (see for instance Edmond and Miles, 1984: Lopes et al, 1998). For instance, in Ghana some of the typical challenges faced by the

construction industry are linked to excessive bureaucratic conditions, a weak materials supply base, financial uncertainties, an unregulated labour market and poor management practices (Amoa-Mensah, 2002). Furthermore, infrastructure such as transportation networks, telecommunication and power supply systems are not fully developed. These challenges which stems from the weak technological, economic and structural conditions prevailing have also been found to also exist in many other developing countries ((see for instance Ofori, 1994; Faniran, et al, 2000). Thus, the geographical position of Ghana notwithstanding, the construction industry in Ghana is influenced by many problems and challenges common in many other developing countries.



Figure 3.1: Map of Africa showing the position of Ghana.

Source: www.Ghanaweb.com (2007)

Internally, Ghana is divided into ten regional administrative areas with the capital, *Accra*, located near the south close to the sea, (the Gulf of Guinea) (Figures 3.1 and 3.2). By World Bank standards, Ghana is listed amongst low- income economies with GDP growth of 4.5%, and GNP per capita of around US\$ 300 (see African Development Indicators, 2004). However, notwithstanding the low-income status, the construction industry's contribution to

the GDP relatively conforms to what is significantly typical in many developing countries (see for instance, Lopes et al, 2000: Zawdie and Langford, 2000).

Thus, like most economies, the industry does not only provide a structural base to the economy but also determines the productivity of investment and accordingly the rate of development (see for instance Sorguc, 1994 cited in Kuruoglu and Ergen 2000). However, typical of many developing countries, the resultant economic growth is skewed and strongly concentrated in the capital city, *Accra* and its nearest peripheries (Ghana Living Standard survey, 1995; Adjei-Laryea, 2000).

As a result, available estimates indicate that the urban population in the *Greater Accra region* (Figure 3.2) is growing in excess of 4.3% per annum as compared to about 3% for the national average (Laryea-Adjei, 2000). The implication is that, business activities including construction activities are strongly concentrated in the *Greater Accra Region*.

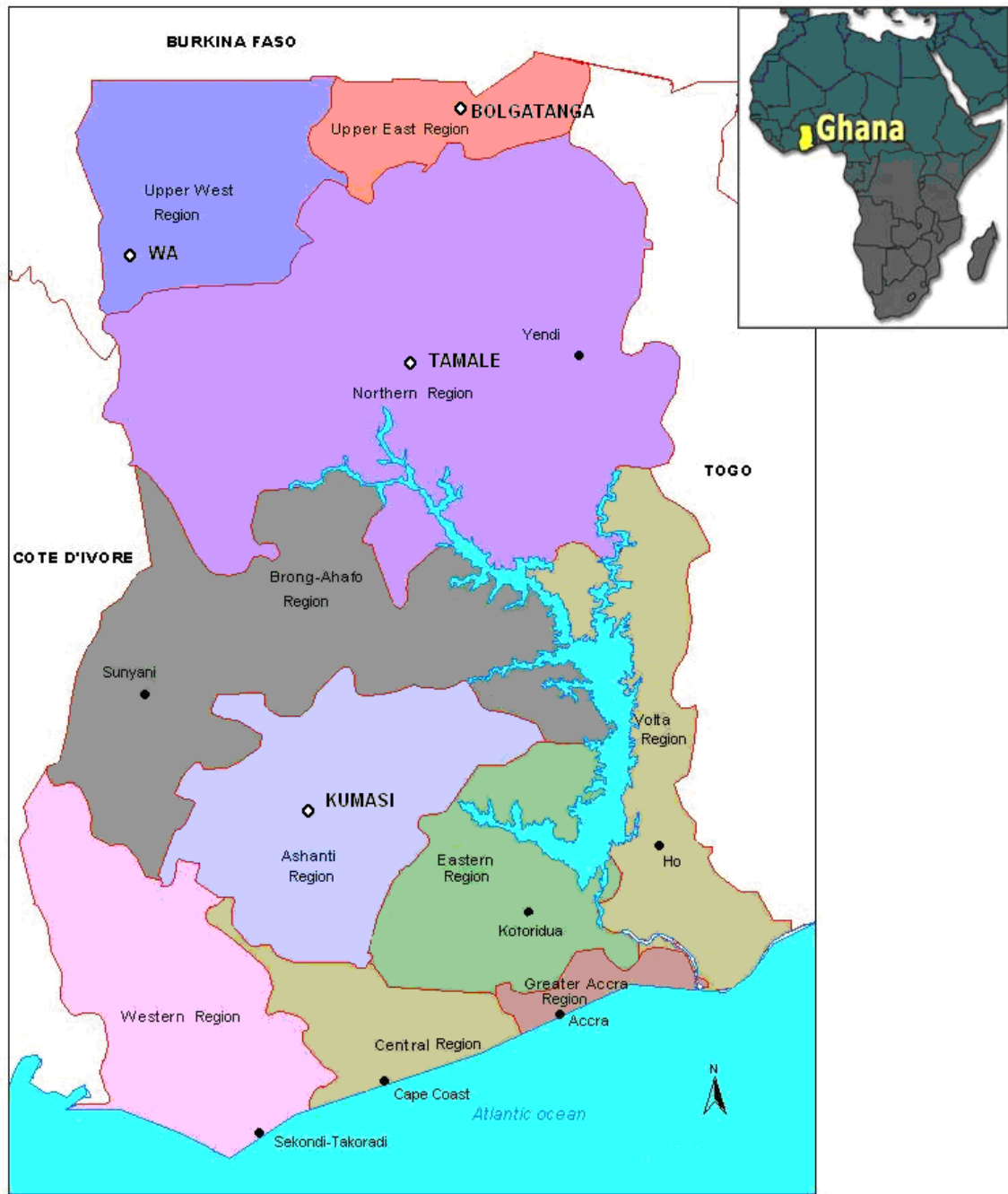


Figure 3.2: Map of Ghana showing the *Greater Accra* region and the second largest city, *Kumasi*

Source: www.Ghanaweb.com (2006)

3.5.2 The Institutional Profile and Significance of the Construction Industry

This section provides an insight into the institutional profile (section 3.5.2.1) and the significance of the Ghanaian construction industry (3.5.2.2)

3.5.2.1 The institutional profile

The institutional profile in terms of procurement routes, tendering procedures and contract administration in the Ghanaian construction industry is well studied and documented (see for instance Edmonds and Miles, 1984). The problems and challenges facing the industry are also well known (see for instance Ofori, 1980; 1990; 1993). As in many commonwealth countries, the Ghanaian construction industry derives its practice from the British construction industry. Consequently, a key feature of the Ghanaian construction environment is the separation between design and construction. Furthermore, the professionals tend to operate independently and often owe allegiance to their respective professional bodies namely, Ghana Institution of Architects (GIA), Ghana Institution of Engineers (GhIE), and Ghana Institution of Surveyors (GIS). Thus, the seemingly adversarial tendencies believed to be traditionally associated with the construction industry (Masterman, 1992), is also very reminiscent in the Ghanaian industry (Banini, 1983). The development and introduction of alternative procurement systems and the

subsequent emergence of the project management concept have also been witnessed in recent years (Ahadzie et al, 2004). Consequently, many construction organizations now provide project management consultancy alongside their primary profession (see *ibid*). This trend is similar to practices described by Odusami et al (2003) in Nigeria. Thus, while the traditional system of managing projects is still popular, the emerging growth of the project management concept has gradually led to the expansion of project management divisions within companies/consultancies offering the traditional professional practices.

3.5.2.2 The significance of the Ghanaian construction industry

The Ghanaian construction industry continues to occupy an important position in the nation's economy. In the early 1990s, the contribution of the industry to GDP dropped to a long term low of about 2.7% (UK Trade and Investment, 2004). However, recent figures indicate that it has once again appreciated to a significant level of 4.2% (*ibid*). The informal sector (i.e. involving self build houses) has also become very buoyant in recent times as a result of some relatively modest improvement in the economy and especially remittances from Ghanaians living abroad (Tipple et al, 1992). However, despite the significant contribution of the informal sector their activities are largely not documented and this is typical of observations made by Wells (1999) in many SSA

countries (see also Muya et al, 2006). In effect, the actual growth in the construction industry could be more than the official figure presented if the informal sector is also well accounted for.

In particular, it is notable to recognise the contribution being made by property developers in contemporary times who now account for the largest share of the “formal” housing sector (Amoa-Mensah, 2003; UK Trade and Investment (2004). In effect, while there seems to be some decline in public sector and publicly funded projects, the private sector spurred on by investment in housing has emerged as a potential hub for growth of the construction industry. Similarly the sector including project-based segment appears to have emerged as the largest employer of human resources (Ghana Living Standards Survey, 1995: Adjei-Laryea, 2000). This trend is also typical of observations made by Wells (1999) in many developing countries such as Tanzania and Kenya.

The significance of the Ghanaian construction industry is also manifested in the proliferation of building contractors in the general business environment. Currently, the Ghanaian Ministry of Works and Housing (MOWH) has over 20,000 “building contractors” on their registered list, which is relatively large given the “size” of the economy (Ayisi, 2000). This does not include other interested groups in the supply chain such as manufacturers, suppliers and retailers whose contributions are also immense (see

for instance Tuuli, 2000). Given that economic growth is largely skewed towards the capital, more than 60% of the registered building contractors, particularly the large organisations, tend to operate officially in the *Greater Accra region* (Ayisi, 2000). The second largest city of Ghana, *Kumasi* accounts for only 12% whilst the remaining eight regional administrations put together account for the remaining 30%. Indeed, the nature of the industry is such that there is a strong incentive for even the firms whose main operational duties are outside the *Greater Accra region* to keep “back-up” offices in the capital so that their potential for attracting ongoing and future projects can be enhanced (see Ayisi, 2000).

3.5.3 The Housing Sector

As in many developing countries, the provision of housing still remains one of the most critical socio-economic challenges facing Ghana (see Tipple et al, 1999; Konadu-Agyeman, 2001). However, following the current global paradigm shift, the Government of Ghana (GoG) has withdrawn from direct housing supply to the role of a facilitator (see UK Trade and Investment, 2004; State of Nation Address, 2005). The role of a facilitator means the GoG concentrate on creating the enabling environment for the private sector to thrive, including assistance with finance where necessary. Consequently the housing sector of the Ghanaian construction industry is now characterised by private housing developers many of which have come together to form the Ghana

Real Estate Developers Association (GREDA). GREDA was established by the Ministry of Works and Housing (MOWH) of Ghana and the private estate developers in 1988 and is a private company limited by guarantee (Ashley, 2003). Extrapolation of data provided by Ashley, (2003) and Amoa-Mensah, (2003) suggests that between 1989 to date, the GREDA members have through their own resources successfully completed over 120,000 house-units, which is significant by all standards in Ghana (Amoa-Mensah, 1999). Given the significant contribution that the GREDA is making towards housing supply in Ghana, the GoG has recently recognised their efforts by initiating a financial package to help stimulate the development of 100,000 house-units into the Ghanaian market over the next two years (see Budget Statement, President of Ghana, 2005).

Currently, the membership of the GREDA stands at over 400 (Ashley, 2003). However, as a reflection of the general construction demography, over 95% of these firms are registered and operate in the capital city, *Accra*. *Kumasi* the second largest city accounts for only 2.4% whilst the remaining eight regional administrations account for a mere 2.6%. For this reason, out of over 120,000 house-units completed by the GREDA so far, more than 70% have been constructed for the *Greater Accra region* where they seem able to attract willing buyers (Anokye, 2000; Ashley, 2003). Moreover, it is evident that most of the GREDA members based in *Greater Accra* region are also strongly involved in the 30% of

house-units that have been implemented in the other regions of the country (Anokye, 2000; Ashley, 2003). Thus, while the GREDA members are mostly based in the capital city, there is an indication that most of these members are responsible for delivering a majority of MHBPs in all parts of Ghana.

3.5.4 Evolution of Management Practices in Mass House Building Projects in Ghana

The earliest MHBPs built in Ghana were implemented in the late 1950s using traditional management practices (Figure 3.3). This was at a time when the GoG was solely responsible for housing supply and these projects were mostly implemented by the then state owned, State Housing Corporation (SHC)⁶ (Ofori, 1989). The management of the execution of these projects were undertaken largely using direct labour as there were no registered contractors at this time (ibid). Direct labour here suggests the craftsmen (including labourers) were engaged as full time employees by the SHC. Given the management approach adopted, the architect as the team leader was responsible for supervision and management of the physical construction (Figure 3.3).

Thereafter, the introduction of “registered contractors” in the late 1960s opened the way for multiple contractors to be engaged

⁶ Following the paradigm shift in housing supply, the State Housing Corporation has been privatised and is now known as State Housing Company.

often on serial contracts and this limited the responsibilities of the design team to only design and the associated specifications. Contractors then became responsible for the management of physical construction by engaging their own labour force (Figure 3.4 below). Unlike the direct labour engagement there was a contractual relationship between the property developer (i.e. SHC) and the contractors while the architect played a supervisory role on behalf of the property developer.

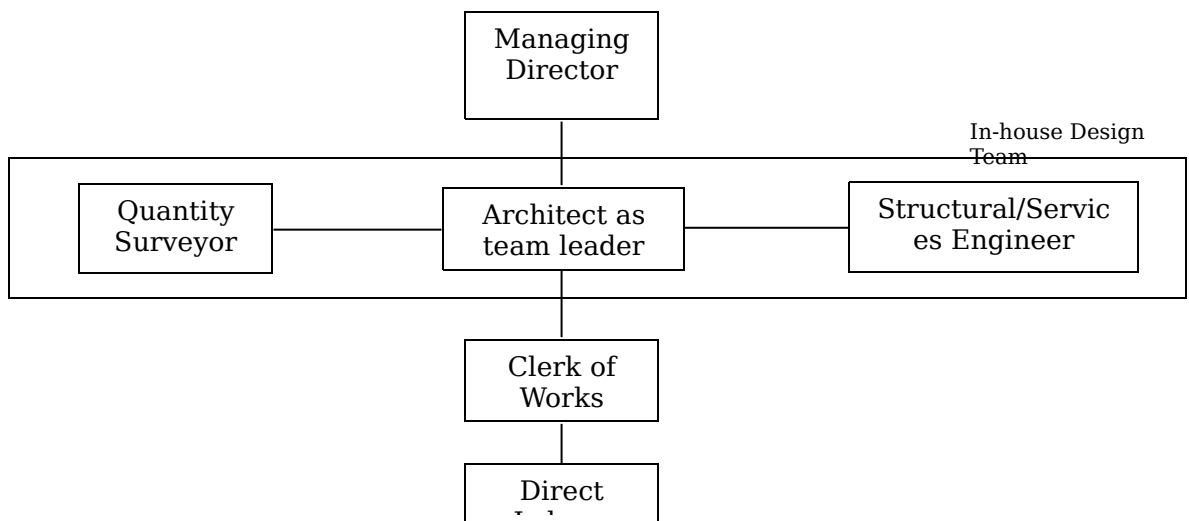
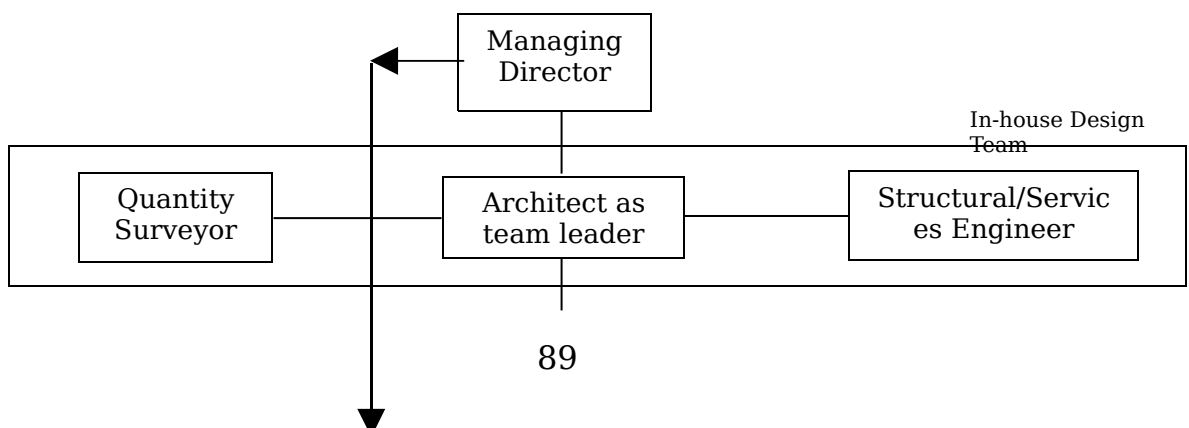


Figure 3.3: Typical organizational structure of MHBPs in the 1950s

Source: Ahadzie et al (2004)



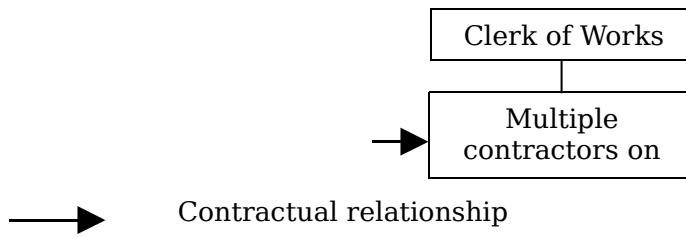
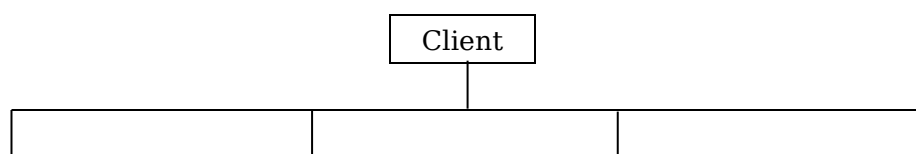


Figure 3.4: Typical organizational structure of the SHC involving the use of multiple contractors on serial contracts

Source: Ahadzie et al (2004)

In the late 1970s, the situation changed further when speculative housing was introduced in the Ghanaian market by some private and quasi-government organizations. Unlike the SHC, these private and quasi-organizations did not normally have in-house design teams, and hence normally appointed “external consultants” to manage the design aspect of the project on their behalf (Figure 3.5). These consultants normally comprised the design team led by the architect and who formed a consortium. Under the supervision of the consultants, contractors were appointed to take contractual responsibility for the management of the physical structure (Figure 3.5). For the next decade this management approach emerged predominant and has become the conventional system for housing delivery in Ghana



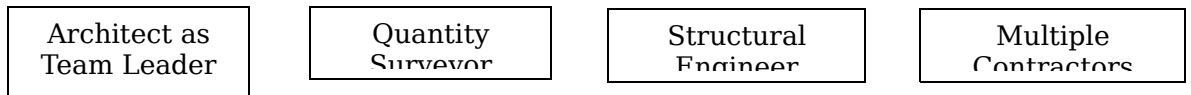


Figure 3.5: Typical organizational structure involving external consultants and multiple contractors

Source: Ahadzie et al (2004)

Generally, the literature suggests that the MHBPs that were executed under the traditional systems described were fraught with management problems and this might have contributed to their rampant failures in meeting performance targets (see Ofori, 1989; Amoa-Mensah, 1999). In many instances, contractors were blamed for the recorded poor performances and were criticised for having limited knowledge in the application of requisite management techniques.

3.5.5 Project Management Practices in Mass House Building Projects in Ghana

Project management as used in this context refers to the scenario where an individual is appointed besides the design team to take responsibility for the management of design and construction of project from conception to operation. While this practice is still evolving in developing countries, researchers and practitioners are convinced that it has the potential to improve the management of

construction projects (Abbasi and Al-Mhamara, 2000; Odusami et al, 2003).

In Ghana, project management practice in MHBPs was first introduced by the Social Security and National Insurance Trust (SSNIT)⁷ in 1989 (Ahadzie et al, 2004). Hitherto, the SSNIT, a quasi-governmental organization relied largely on traditional management practices using external consultants in the implementation of MHBPs. However, as noted by Ofori (1989) it was common for most of these projects to often experience time and cost over-runs of more than 100%. The GoG, the major stakeholders, and the general public whose contributions were being used for such investments became alarmed and lost all confidence in the SSNIT as a housing provider (see *ibid*). It was during this trying period that the SSNIT appointed their first PM on a MHP in Ghana (Ahadzie et al, 2004)

3.5.6 The Contribution of Project Managers to the delivery Mass House Building Projects

⁷ The SSNIT is responsible for managing the social security deductions on behalf Ghanaian workers. Part of the money deducted were used for these housing projects as investment on behalf of the contributors

The project on which the SSNIT appointed its first PM involved the construction of 300 single storey-housing units, each of 82m² internal floor area in the *Sakumono* area of the *Greater Accra region*. The project initiated in 1989 was executed by 12 small-scale contractors⁸ who were managed by the PM. Figure 3.6 represents the organizational structure. Following management interventions provided by the PM, the 12 small-scale contractors were able to deliver approximately 160 house-units within four months working to about 40 house-units per contractor for the year. This rate of delivery was remarkable given that it was the first in the annals of house- building in Ghana to be achieved by small-scale contractors (Amoa-Mensah, 2002).

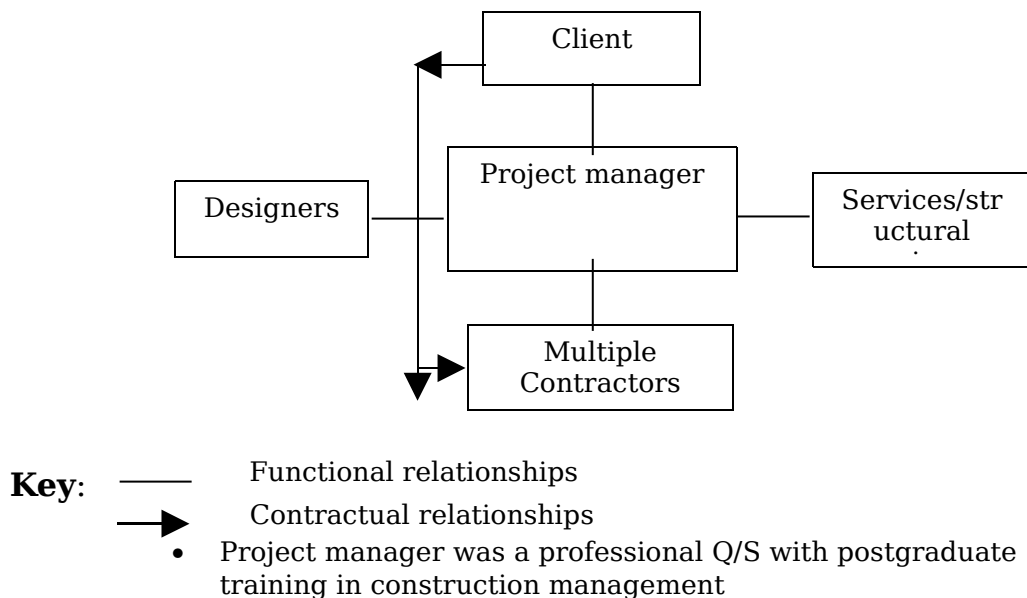


Figure 3.6: Typical organizational structure involving modern day PM

Source: Ahadzie et al (2004)

⁸ Small-scale contractors are under sole ownership, headed by entrepreneurs with limited experience in construction and having other business interest. In most instance they have been blamed for poor performance on MHBPs built in the past.

As a result of the perceived successful performance of the PM the client (i.e. the SSNIT) became sufficiently confident to invest in more houses under the same management. Subsequently 1637 house units were built in *Sakumono* phases 1 and 2, using a total of 37 small- scale contractors during the three years the project was implemented. The average cost per completed house-unit was 3.39 million cedis⁹ as against an initial contract sum of 3.44 million cedis. This represented an average cost saving per house- unit of 1% at a period when the average annual construction cost increase in Ghana was estimated at 16% (Amoa-Mensah, 1999: Osei-Tutu and Adjei-Kumi, 2000). During the first year of implementation in 1989, each of the small –scale contractors achieved an average annual performance output of about 78 million cedis on the projects as compared with the 25 million cedis upper operational limit for their class. This represented a financial turnover of 3.12 times their upper limit suggesting that with an appropriate management system, small- scale contractors can expand their operational capacity to achieve increased delivery within the available resource base (ibid).

As a result of the successful completion of *Sakumono* phases 1 and 2, the client demonstrated their satisfaction by commissioning similar projects under the PM. In *Ashongman*, also a suburb of the *Greater Accra region*, 500 house-units of internal floor area 142m²

⁹ Cedi is the currency used in Ghana. 1 US\$ = about 300 cedis in 1989. At the time of writing 1 US\$ = about 9,000 cedis

were executed between 1994 and 1995. The 500 house-units were delivered within a year with a total of 12 small-scale contractors at a near zero time and cost over-runs (Amoa- Mensah, 2002).

In the opinion of Amoa-Mensah (1999; 2002; 2003) the PM was largely responsible for the significant improvement in meeting performance targets on these MHBPs, which for far too long had been elusive in the Ghanaian housing industry (see also Ofori, 1989). This led Amoa-Mensah (1996; 2002), to summarise the achievement as follows:

“This laudable output performance has not only led to higher efficiency but also proved a case that with meaningful resources management, the small scale contractor can expand its performance capacity to achieve increased delivery within the available resource base.”

Thus, one of the key contribution's of the PM was the ability to manage a team of small-scale contractors to successfully deliver on these MHBPs. These small-scale contractors by Ghanaian standards are the least organized and often have limited knowledge in the requisite management principles (Ayisi, 2000). Subsequently, the PM had to introduce a number of innovative management principles in tandem with the challenges posed by the Ghanaian project environment and the specific needs and

weaknesses of the contractors (see for instance Ahadzie et al, 2004).

Indeed, the recognition of the perceived positive role of PMs in the Ghanaian situation has culminated in their successful integration into the operations of most emerging property developers including members of the GREDA (Ashley, 2003). Figure 3.7 is a typical organisational chart of a typical property developer showing the relation of the PM to other key management personnel. The functional relationship indicates that while all the key management personnel report to the managing director, the PM has the authority to coordinate the activities of the functional managers including the management of direct labour and/or works contractors.

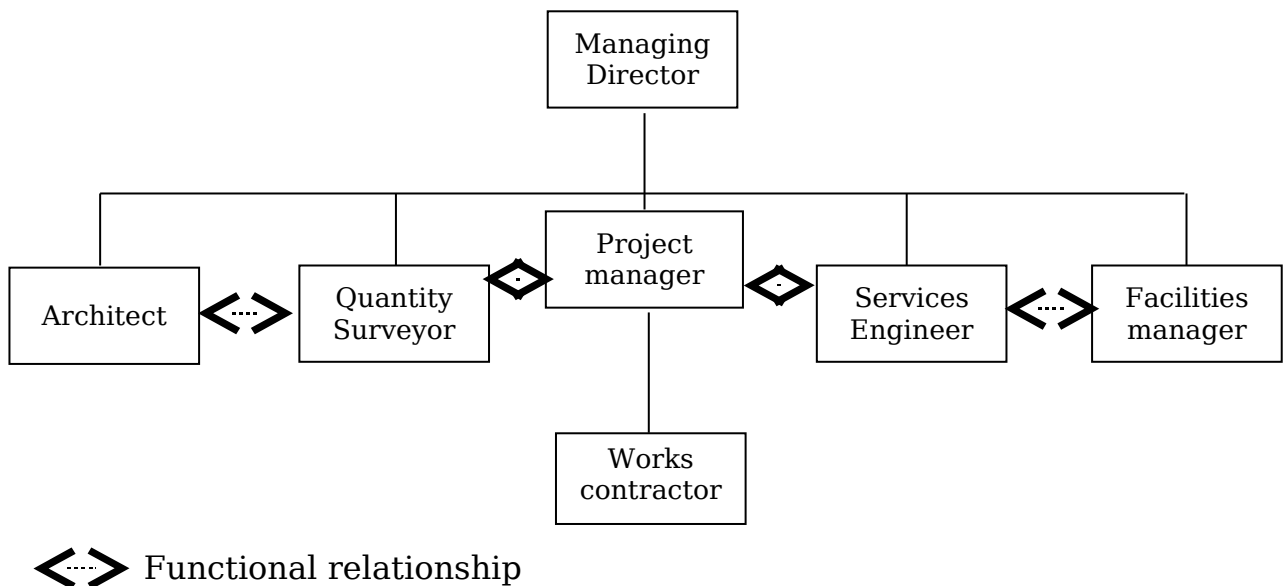


Figure 3.7: Typical organizational structure for GREDA members

Source: Modified after Ashley (2003)

On a typical MHBP, the PM will be fully involved in the decision to build, help acquire the land including associated feasibilities studies, identify appropriate procurement routes, supervise and manage physical construction and provide the necessary advice on facilities management. Depending on the organizational structure in place, the architect and quantity surveyor may be in-house or out-house. The facilities manager (Figure 3.7) may be appointed earlier or later depending on the size of the company. However, notwithstanding the form of organizational structure, the role of the “modern day” PM has become embedded and is now acknowledged as the most critical factor towards achieving effective performance in the management of MHBPs (see Amoah-Mensah, 2002; Ahadzie et al, 2004; 2005a). Presently, most property developers engage the services of “labour-only-subcontractors”. These “labour-only-subcontractors” work as team of “gangs” and offer only labour services on casual basis under the management of the PM (Figure 3.7). For the purposes of simplicity these labour-only –subcontractors and/or artisans are referred to as works contractors in the ensuing discussions throughout the thesis.

3.5.7 Towards Assessing the Performance of Project Managers in Mass House Building Projects in Ghana

Typical of the construction industry in many developing countries, performance measurement of PMs is not an issue that has been

given serious consideration in Ghana (see Ahadzie et al, 2004; 2005a; 2005b). Indeed, in Ghana it was also only recently that Amoa-Mensah, (1999; 2002) provided some evidence of performance measures in the context of HRM by focussing on the assessment of the performance of PMs. However the assessment criteria were limited to the so-called traditional measures of time, cost and quality. Furthermore, based on the evidence presented in chapter two (section 2.4.1-2.4.4) of this thesis, it is clear that, while assessment of the performance of PMs on traditional measures is potentially useful, it does not provide opportunity for their continuous professional development as these factors lie outside their control.

Thus, while the positive contribution of PMs towards the management of MHBPs in Ghana is acknowledged, the lack of appropriate criteria amenable to their continuous performance improvement does not provide sufficient incentives for best practice improvements in the management of future projects. The development of relevant performance measures that fits the tenets of HRM orthodoxy should therefore be explored towards enabling an understanding of the appropriate skills required. This will help PMs in Ghana to develop a clear understanding of the key performance variables that can help them improve their managerial skills in the implementation of future MHBPs.

3.6 THE WAY FORWARD FOR PMs' PERFORMANCE MEASURES IN GHANA AND THE RELEVANCE FOR OTHER DEVELOPING COUNTRIES

The foregoing has to a large extent demonstrated that while PMs are making reasonably positive contribution towards the management of MHBPs in Ghana, very little has been done towards sustaining their career development towards best practice improvement in the management of future projects. Furthermore, the literature has demonstrated that this weakness is reflected across the construction industry in many developing countries. It is argued that given the severe housing situation faced by many developing countries, PMs operating in developing countries such as Ghana require potentially robust performance criteria towards meeting the future challenges ahead.

As shown in chapter two, a competency- based model can be used to appropriately underpin the performance management and development functions required in this circumstance. That is, with the identification and development of the appropriate competency profiles, PMs who lack the necessary skills may be inspired to acquire the relevant training for their professional development while for those who already possess such relevant skills, would be provided with the impetus for achieving higher performance levels. Additionally, identification of these relevant measures will provide a structured approach for property developers towards

making informed and objective judgements in the selection and/or appointment of appropriately skilled and qualified PMs. In effect, the development of an effective competency profile and complimentary management programmes may provide an opportunity for both corporate and individual growth. Thus, this research has the potential of encouraging both property developers and PMs engaged in MHBPs in Ghana and for that matter many developing countries to appreciate a range of core competencies that could be useful for their future career development and/or professional and business competitiveness.

Subsequently, and informed by the research questions set in introduction to this thesis (chapter, one section, 1.3) this research intended to construct a predictive performance model through identification of the behavioural measures that would lead to the effective performance of PMs in MHBPs. The methodology utilized in addressing the above questions draws significantly from the well-acclaimed *contextual-task* performance framework already identified in chapter two. The detailed theoretical background of this framework is described in the next chapter.

3.7 SUMMARY

In this chapter, a review of research and development in the management of human resources in developing countries,

especially in the context of PMs' performance measures has been described. The literature revealed that while earlier attempts suffice to improve HR issues, the focus, (which are largely on craftsmen productivity) did not sufficiently engender improving the personal skills of PMs.

It was established that while some limited attempts have been made towards modelling the PMs potential performance, the conceptual, methodological and substantive approaches adopted leave scope not only to construct a more rigorous predictive performance model but also a model that satisfies the tenets of contemporary HRMs practices. Consequently it was contended that given the significance of MHBPs, the development of appropriate PMs' performance measures can serve as an important step for contributing to the research agenda in project management in developing countries. Subsequently, a working definition for MHBPs was provided in the context of the study.

Also in this chapter the background of the study area, Ghana was introduced. The construction industry, in particular, the housing sector and its associated HRM practices in MHBPs were therefore illuminated including the methodology for assessing the PMs' performance. It was noted that the construction environment in Ghana, in particular the practice of project management in MHBPs made it potentially relevant to adopt Ghana as a case study for achieving the research objectives.

Subsequently, the chapter concluded by re-emphasising that competency-based measures might be appropriate for addressing the key research questions. The next chapter would therefore detail the developement of an appropriate conceptual model for this study.

CHAPTER FOUR

CHAPTER FOUR: DEVELOPMENT OF CONCEPTUAL MODEL

4.0 INTRODUCTION

This chapter now discusses the development of an appropriate conceptual model for the study. Firstly, the discussion starts with some basic assumptions about the term “performance” as used in the research context. This is necessary to help provide a complete understanding of how the terminology has been applied in the ensuing theoretical framework, particularly, an aspect that draws significantly from organisational psychology theory. Thereafter, the various components of the theoretical framework are elucidated followed immediately by the development of the conceptual model.

4.1 BASIC ASSUMPTIONS ABOUT PERFORMANCE

In chapter two (section 2.1), it was asserted that one of the critical issues underlying the concept of performance measures is identifying an appropriate definition for the term “performance”. According to Yasamis et al (2002) the term “performance” may be interpreted to mean different concepts depending on the context in which it is used. At the “Global” level, the terminology could be used to represent the results of activities. However, traditionally it also means an individual and/or system being effective and/or

efficient (ibid). What is more, the terminology is now associated with numerous attributes (such as productivity, quality, profitability, growth) making it more difficult to relate any better to its meaning (see McCloy et al, 1994; Yasamis et al, 2002).

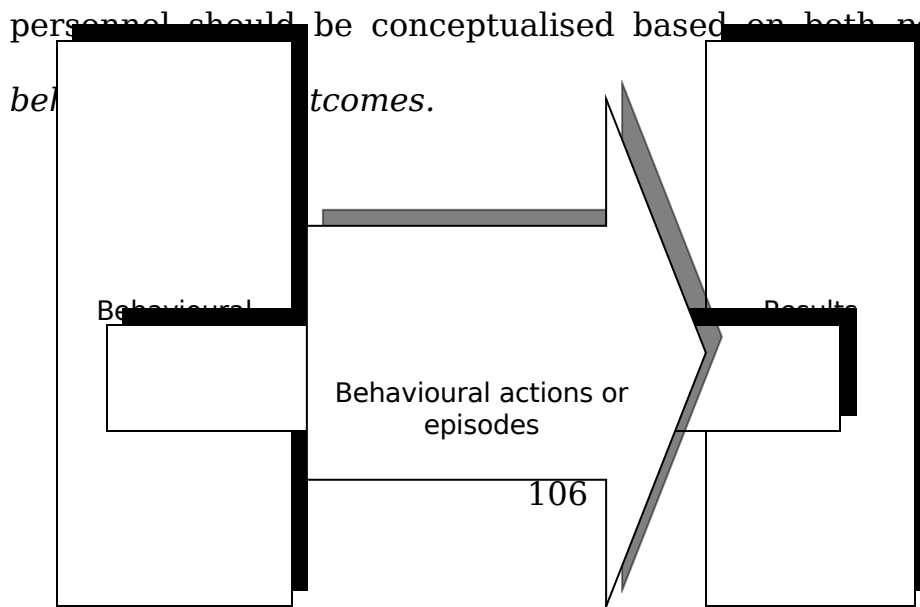
Within this research context, because the emphasis is to investigate the attributes within the control of PMs (i.e. those dealing with their competencies), here, the key assumption about the term performance is that, it is appropriate behavioural action relevant to contributing towards the achievement of the goals of an organization (Campbell, 1983: McCloy et al, 1994). Subsequently, it is envisaged that performance should be; multidimensional; episodic (i.e. spontaneous but enduring)); and evaluative (Motowidlo et al, 1997). Being multidimensional suggests that for any specific job, there are a number of substantive performance variables that are distinguishable in the way they correlate and co-vary with other variables (McCloy et al, 1994). Alternatively (and as already noted in chapter two), being multidimensional means that the variables involved are complex and grouping them together (for the purpose of evaluations) makes it difficult to isolate their potential effects (Motowidlo et al, 1997).

In being episodic, this suggests that it is possible to identify the extent to which behavioural competencies are organisationally desirable or undesirable. Moreover, by considering the

contribution of an individual's behavioural action over a period of time, it should be possible to scale the degree to which they are desirable with enough precision to distinguish between them (ibid). Equally important is the assumption that performance should be evaluative, and this is critical towards assessing performance outcomes (Motowidlo and Borman, 1997; Motowidlo et al, 1997; Liu and Walker, 1998).

Thus, here, the underlying assumptions are that; performance, behaviour and results are not the same. While behaviour is the observable things that people do while at work, performance is behaviour with an evaluative component (ibid). Alternatively, results are conditions of things that are changed by performance and subsequently may contribute to or detract from organizational accomplishments (Motowidlo et al, 1997; Tett et al, 2000).

Figure 4.1 presents a framework that has been designed to simplify how these assumptions influence each other. This framework concurs with the contemporary ideology (see chapter two) that performance measurement of key management personnel should be conceptualised based on both performance



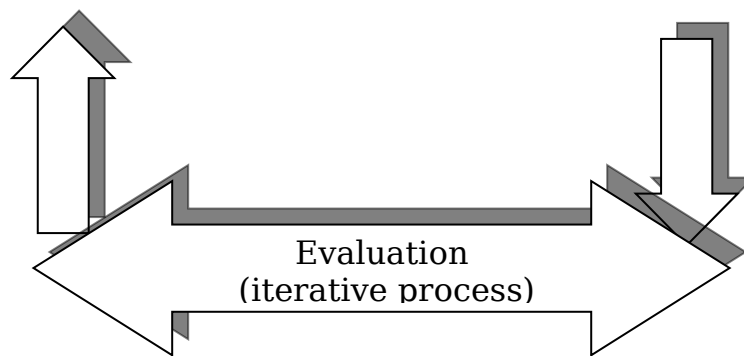


Figure 4.1: Framework capturing key assumptions of job performance

Source: Adapted from Ahadzie et al (2006b)

That is, the framework acknowledges that performance is not only a function of the attributes of an individual (PMs in this case) but also a function of the attributes of the anticipated result. In addition, performance is depicted as an iterative process in the sense that, it becomes a learning process for continuous improvement. These guiding assumptions and the key research questions (restated below for ease of reference) influenced the underlying theoretical framework adopted for this study. The key research questions of the study being:

- What should be the appropriate performance framework for addressing the PMs' performance domain in MHBPs in developing countries such as Ghana?
- Given that the skills required by PMs are likely to develop and change as MHBPs progresses throughout the project lifecycle, how can these be factored into the performance framework?
- In recognition of the inimitable and relatively difficult project environment prevailing in developing countries such as Ghana, what performance profiles are appropriate for engendering the professional development of PMs at the various phases of the project lifecycle?

In view of the arguments made in favour of adopting a methodology that allows a more in-depth investigation of the PMs performance domain (chapter two, section 2.4), the theoretical framework underlying the *contextual-task* typology was used in developing an appropriate conceptual model.

4.2 THE THEORETICAL FRAMEWORK

This section discusses the underlying theoretical framework for the study. The philosophy behind the framework is explained including the specific details. Apart from drawing on the

“organisational theory of job performance”, the theoretical framework also draws from the “conventional wisdom of success criteria” (in particular Pinto and Slevin (1988) project success model) and a “framework for project lifecycle” proposed by Lim and Mohammed (1999). While the former was derived from applied psychology literature, the latter two were derived from project management practice including construction. The significance of the psychological domain in this framework (see also chapter two) is reflected in the premise that behavioural competencies are psychologically motivated (Buss and Larson, 2005; Jha, 2006). Then again, it was also important to incorporate existing project management practices so that the framework will address issues that are unique to performance measurement in mainstream project-based organizations in particular. This multidisciplinary approach was adopted to help develop a robust conceptual model, towards addressing the key research questions including satisfying the basic assumptions of performance.

Thus, while the organizational theory of job performance addressed the main objective of the research (i.e. in helping to address the research questions), the conventional wisdom of project success helped address the evaluative aspect of the basic assumptions underlying performance (i.e. the results or performance outcome) (see Figure 4.1). On the other hand, the project lifecycle framework addressed the question of linking the

potential performance criteria to the various phases of the project lifecycle.

4.2.1 Organisational Psychology Theory of Job Performance

Borman and Motowidlo (1993) posited that in trying to understand the organisational job performance domain, the elements of the behavioural competencies involved should be grouped into two main distinctions: *contextual performance behaviours* and *task performance behaviours*. Borman and Motowidlo (1993) contended that *contextual performance behaviours* differ from *task performance behaviours* in four major ways (see also Miller and Werner, 2005):

- Task behaviours contribute either directly or indirectly to the technical function, alternatively contextual behaviours support the organizational, social and psychological environment in which the technical function must operate;
- Task behaviours usually vary between different jobs in the same organization; alternatively, contextual behaviours are common to many jobs or all jobs;
- The major source of variation in task behaviours are human characteristics such as knowledge, skills and abilities that vary with task proficiency, alternatively, the major source of

variation in contextual behaviours is not proficiency but volition and predisposition; and

- Task behaviours are role-prescribed which incumbents must execute normally for a reward, alternatively contextual behaviours are not role-prescribed and thus are normally not (explicitly) part of incumbents formal responsibilities and obligations to an organization.

Thus, a prime premise of the *contextual-task* typology is that whilst *task performance behaviours* are job-specific, prescribed and rewarded, *contextual performance behaviours* relate to those discretionary job-related acts which are not formally recognised as part of the job and therefore not rewarded (Organ and Paine, 1999).

In practical terms, *task performance behaviours* among others identifies the demonstratable behaviours associated with individuals undertaking technical functions such as the transformation of raw materials into goods and services, operating a production machine and providing management and administrative functions. Alternatively, *contextual performance behaviours* are personality oriented and are associated with attributes such as altruism, conscientiousness, initiative, commitment, dedication, discipline and volunteering to help others. Thus, in the construction industry for example, *task*

performance behaviours could refer to behaviours and/or habits exhibited by craftsmen while operating for instance a production machine, laying of bricks, supply of raw materials and/or distributing a finished product (Ahadzie et al, 2006a). Furthermore, at the managerial level, *task performance behaviours* could be associated with the demonstratable behaviours and/or habits exhibited while the PM is performing functions such as organising, planning, programming, coordinating, delegating and controlling (Motowidlo et al, 1997: Ahadzie et al, 2006).

Conversely, *contextual performance behaviours* would be the behavioural competencies exhibited by, for instance, the PM to ensure that the social and psychological environment within which the construction projects are being executed is supportive enough to make the functional activities a success. Thus, incorporating *contextual performance behaviours* acknowledges that working in an organisational setting is different from working alone (Van Scotter and Motowidlo, 1996).

Further justifications for distinguishing *contextual performance behaviours* from *task performance behaviours* stems from the earlier assumption that the performance domain is multidimensional and complex (Borman and Motowidlo, 1993). That is, there are many kinds of behaviours that can hinder or advance organisational effectiveness and grouping them together

for investigation makes it difficult to effectively isolate and understand their impact on the managerial performance domain (Motowidlo and Borman, 1997).

Thus, ultimately, the underlying premise for distinguishing *task performance behaviours* from *contextual performance behaviours* is that, the reason why *contextual performance behaviours* are desirable or undesirable in an organization is different from that of *task performance behaviours* (Motowidlo et al, 1997). The presumption then is that, the antecedents of *contextual performance behaviours* are likely to be different from the antecedents of *task performance behaviours* towards achieving organisational objectives (ibid). Then again, it is also likely that the knowledge, skills and habits associated with *contextual performance behaviours* would be different from those associated with *task performance behaviours* (Motowidlo and Borman, 1997). To this effect, the *contextual-task* typology is of potentially significant value because it is geared towards a fine grained analysis of managerial behaviour, its effect and measurement which should be useful for developing a more detailed, specific and rigorous understanding of training requirements (Tett et al, 2000).

Since Borman and Motowidlo (1993) first hypothesised the *contextual-task* distinction, other organizational psychology researchers such as Van Scotter and Motowidlo (1994), Van

Scotter and Motowidlo (1996), Conway (1999) and Scullen et al (2003) have replicated the concept in various dimensions and found it to be valid and robust. In particular, Conway (1999) and Scullen et al (2003) successfully replicated the theory using top level managers such as PMs and concluded that the *contextual-task* typology is particularly relevant to the managerial performance domain. The reason being that as managers often get jobs done through subordinates and peers, and it would seem particularly important that, they (managers) should understand how uniquely both performance dimensions contribute towards their performance. Presently, the evidence suggests that approximately 30% of the managerial performance domain can be explained by *contextual performance behaviours* indicating that it cannot be ignored in performance evaluations (Borman and Motowidlo, 1993). Conway (1996) also reported thus:

“When a panel of industrial/organizational psychologists were asked to sort performance dimensions from 14 multitrait multimethod matrices in applied psychological literature into contextual and task performance domain, 55% were identified as task dimension and 30% contextual dimension while there was disagreement in regard to the remaining 15%.”

Thus, HRM researchers are convinced that the *contextual-task performance* distinction is useful for uniquely isolating complex and multivaried managerial performance dimensions involved in

behavioural competencies (Conway, 1999). Indeed, the contention is that the *contextual-task* typology is reasonably rigorous as it has proven to be consistent, reliable and valid across various job performance levels in the HRM genre (Denison and Mersoon, 2000; Tett et al, 2000; Gellatly and Irving, 2001).

However, while there is reasonable evidence that both *contextual* and *task performance behaviours* make a significantly unique contribution to the performance outcome, construction management researchers are yet to give serious consideration to understanding the PMs performance dimensions from this perspective. Indeed, in most project-based sectors of the construction industry, PMs have to deal with a constantly changing and multi-disciplinary team oriented environment (Loosemore et al, 2003). This coupled with the the complexity of “modern day” projects means that the behavioural characteristics of PMs are likely to be more complex and diverse than in most other industries (Dainty et al, 2005). Thus, the challenges faced by PMs in modern day project management might require a well-proven methodology such as *contextual-task* typology, which allows an in-depth investigation of the performance domain. Hopefully, this should help isolate the relevant core behavioural competencies by providing a detailed and somewhat specific analysis of the performance domain under investigation

This brings to the fore the need to identify the appropriate constructs relating to each performance dimension in the framework. Empirically, there are reasonable evidences to suggest that *task performance behaviours* are best predicted by individual differences in *cognitive ability* (Campbell, 1993), *job-specific knowledge* and *skills, task proficiency* and *experience* (Hunter, 1983; Schimts et al 1986; Van scotter and Motowildlo, 1996: Pickett, 1998; Gelattly and Irving, 2001). *Cognitive ability* as used in this sense refers to an individual's level of intelligence including the ability to memorise and remember things whilst *job knowledge* is a measure of ones knowledge of what is required of a particular job. McCloy et al (1994) identifies two main types of measures of *job knowledge*, namely; *declarative knowledge* and *procedural knowledge*. *Declarative knowledge* is knowledge of facts and principles which could be demonstrated by way of cognitive "test". Alternatively *procedural knowledge* is the skill in actually doing what should be done. Thus, procedural knowledge is a combination of knowing what to do and being able to do it. Subsequently, it includes skills such as cognitive, psychomotor, physical, self-management and interpersonal which are all behavioural manifest. Whereas *task proficiency* deals with how well a task is executed, *experience* is what individuals learn over a period of time through, (in particular), informal training or practice- based work (McCloy et al, 1994; Fraser, 1999; Dullaimi et al, 1999).

In contrast, the evidence also suggests that *contextual performance behaviours* could be best predicted by individual differences in *determination, teamwork and allegiance* (Borman and Motowidlo, 1993). However, for managerial jobs, Conway (1999) suggests that individual differences in *job dedication* and *interpersonal facilitation* are more appropriate constructs for establishing prediction levels (see also Gellatly and Irving, 2001). *Job dedication* is defined as the motivational foundation for job performance that drives people to act with deliberate intention of promoting an organisations best interest and includes self-disciplined behaviours such as following rules, working hard and taking initiative to solve problems at work (Van Scotter and Motowidlo, 1996). Alternatively, *interpersonal facilitation* (as noted earlier) are those attributes that help maintain the interpersonal and social context needed to support job effectiveness. These attributes could be demonstrated as spontaneous behaviours (such as altruism) and also encompasses deliberate acts that include cooperative, considerate and helpful acts that assist co-workers' performance.

4.2.2 Conventional Wisdom in Project Success Criteria

It has already been alluded to in general introduction to the thesis that, the fundamental premise on which project management is based is that, the PM is accountable for the success of the project (Godwin, 1993). Success as defined by Rosenau (1984) is when the

project satisfies some externally perceived and/or agreed criteria (cited in Godwin, 1993). The implication is that any behavioural competencies identified should be linked to the expected performance outcome. This is because, ultimately, job performance consists of deliverable outputs underpinned by appropriate behaviours (Pierce, 1994). Furthermore, mapping behavioural measures to the expected results should provide a useful framework through which behavioural competencies can be illustrated in a practical way (Brophy and Kiely, 2000). However, identification of the expected results and for that matter the performance outcomes is subject to debate in mainstream project management practice. In particular, there exists confusion whether the outcome of projects or performance outcome should be defined in terms of project success or project management success or both (Lim and Mohammed, 1999; Cooke-Davies 2002). Equally confusing is the question of who determines the criteria. In this regard, some researchers have suggested that the four most important stakeholders to decide the criteria are PMs, top management, customer-client and team members (Struckenbach, 1997).

These notwithstanding, what is clear is that, whichever perspectives one adopts, the output-based measures constituting performance outcome can only be assessed at the end of project completion. Furthermore, it has become conventional for the criteria involved to be almost always linked to the traditional

measures of time, cost and quality. The reason why these measures based on the iron triangle are so popular is that they are simple to apply and also largely objective. However, in recent times, there has been an acknowledgement that limiting the criteria to these traditional measures excludes the long term interests of many other project stakeholders (Atkinson, 1999) (see also chapter two). Subsequently, the perceived wisdom now is to view success criteria as both measures of the success of the production system in terms of time, cost and quality and the benefit to the stakeholders.

In view of this, numerous project management researchers including Morris and Hough (1987), deWit (1988), Pinto and Slevin (1988), Wateridge (1998), Turner (1993) and Atkinson (1999) have developed alternative proposals. While these alternatives conceptualise the project success criteria against the traditional measures, there is consensus on the need to include criteria that satisfy the interests of other stakeholders. Subsequently, new and emerging criteria such as health and safety, technology transfer, environmental friendliness, risk containment, client satisfaction, stakeholder's satisfaction have become accepted for assessing the performance outcome.

The framework by Pinto and Slevin's (1988) has been the driver behind a number of studies aimed at identifying project success factors especially because of its detailed background (Atkinson,

1999: Lim and Mohammed, 1999; Odusami et al, 2003) (see also Baccarini, 1999). The framework (i.e. Pinto and Slevin) is based on the premise that the key factors in the implementation of successful projects incorporate three criteria: *technical validity*, *organisational validity* and *organisational effectiveness*. *Technical validity* is the first hurdle in the success criteria and this is assessed in the context of whether the project after completion performs as it was intended to work (i.e. an issue of functionality crops in here). Alternatively, *organisational validity* is based on the premise that a project must be “right” or acceptable for the clients for whom it is intended. An important condition about *organisational effectiveness* is that the PM must be involved in making sure that the “right” project is delivered to the client and/or user (Pinto and Slevin, 1988). Thus *organisational effectiveness* is how well the acceptance of the project impacts positively on the user.

A key implication of the three measures of implementation of success (identified above) is that success criteria are equally important both inside and outside the project organisation (Pinto and Slevin, 1988). Subsequently, Pinto and Slevin (1988) used these three measures of implementation of success to develop a 6-factor model reflecting the constructs time, cost, performance (i.e. in respect of quality), satisfaction, usage, and effectiveness (Figure 4.2). Notice that in proposing these constructs, success was centred around two main themes; the *project* and the *client*. The

argument here is that in a typical project, the project must be technically correct and functional. Alternatively, the assessment of success relates to the impact of the project upon its intended user, the clients.

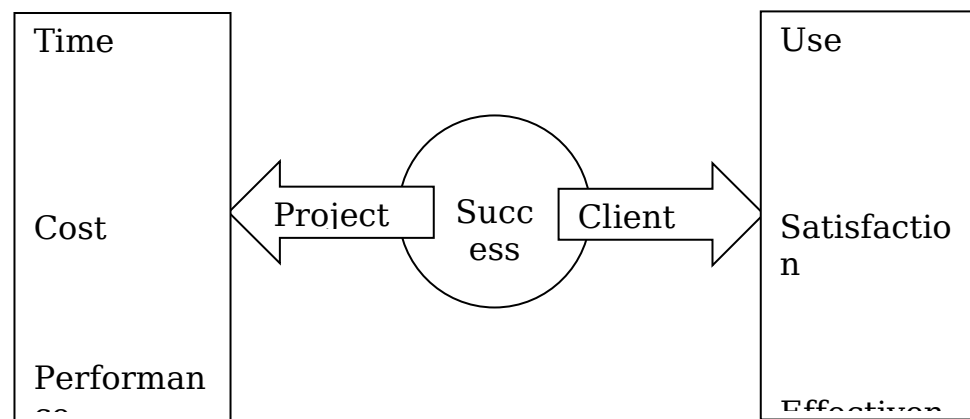


Figure 4.2: Model for Project Success

Source: Adapted from Pinto and Slevin (1988)

Given the recognition earlier that MHBPs are unique from the many one-off projects often encountered in the construction industry (see chapter three), it was necessary to develop appropriate success criteria towards determining the appropriate performance outcome in these projects. Subsequently, using the conventional success criteria (including the new and emerging

ones) as a foundation and, in also drawing on Pinto and Slevin's (1988) 6-factor model, a project success framework for MHBPs was developed as described below.

4.2.3 Developing a Project Success framework for Mass House Building Projects

Figure 4.5, presents a proposed success framework for MHBPs. Note that the underlying themes have been identified as: projects and customers [i.e. drawing from Pinto and Slevin (1988)].

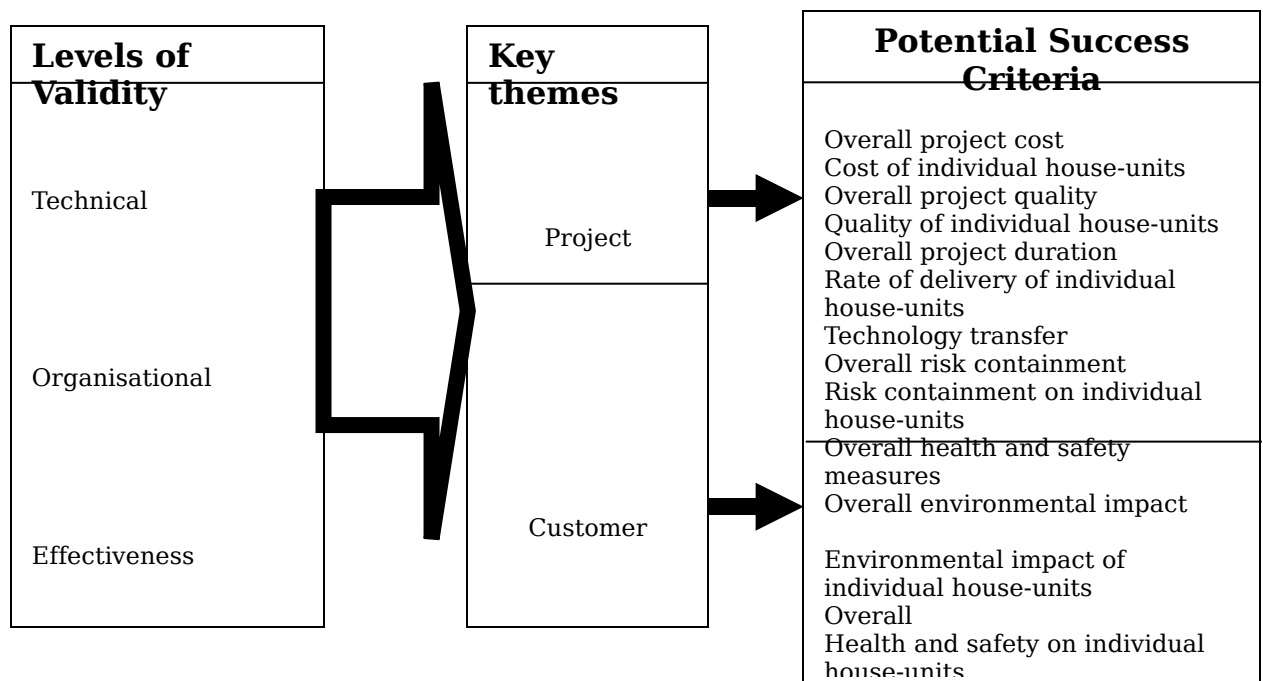


Figure 4.3: Project Success Framework for MHBPs

Source: Ahadzie et al (2007a)

In MHBPs, the critical issue is for the PM to take advantage of the repetitive task involved so as to ensure cost and time effectiveness

through learning and experience (Mahdi, 2004). Alternatively, customers (as the potential users) will expect high quality work that will make a positive impact on their well-being. Thus, whereas issues relating to technical and organisational validity are critical in terms of the project and/or product, it is expected that organizational effectiveness will be influenced largely by customer satisfaction, quality and other subjective measures. Indeed, Pinto and Slevin (1988) concur that organisational effectiveness is assessed subjectively based on a sense of smoother operations and employee and customer satisfaction.

To this end, 15 potential success criteria were identified for MHBPs. Table 4.1 presents a definition of the various variables identified.

Table 4.1: Definition of potential success criteria in MHBPs

Variable	Variable Name	Definition
CSF 1	Overall project cost	Final out-turn cost for overall project including infrastructure such as road networks and streetlighting
CSF 2	Cost of individual house-units	Final out-turn cost for individual house-units.
CSF 3	Overall project duration	Time taken to complete entire project including provision of infrastructure such as road works and streetlighting
CSF 4	Rate of delivery of individual house-units	Time taken to deliver individual house-units.
CSF 5	Overall project quality	Quality of entire project including associated infrastructure as seen by customers and the public
CSF 6	Quality of individual house-units	Quality of individual house-units as seen by the customer or user
CSF 7	Overall customer satisfaction	Satisfaction of customers with overall project outcomes including infrastructure provision
CSF 8	Customer satisfaction on individual house-units	Satisfaction of customers with individual house -units

Variable	Variable Name	Definition
CSF 9	Overall risk containment	The extent to which all kinds of risk were contained or mimimised
CSF 10	Risk containment on individual house-units	Ditto in relation to individual house-units
CSF 11	Overall environmental impact	Impact of construction waste, environmental degradation and pollution on the general public
CSF 12	Environmental impact of individual house-units	Impact of living environment waste such rubbish, sewage, drainage
CSF 13	Overall health and safety measures	Number of accidents and the extent to which employees use appropriate safety gear and equipment
CSF 14	Health safety measures with individual house-units	Health and safety in terms of health hazard posed by the living environment, poor materials poor construction practices
CSF 15	Technology transfer	The extent to which new technology significantly improves the design and construction of a living space by decreasing installed cost, increasing installed performance and improving the construction process is applied on the project.

Source Ahadzie et al (2007a)

Granted that virtually no systematic studies have been undertaken on success criteria in MHBPs in developing countries in particular, the definition of the 15 success criteria was largely influenced by drawing on mainstream project management literature (e.g. Morris et al, 2000), and also informed by the notion that in MHBPs, PMs have to use their knowledge of repetitive techniques to achieve, for instance, cost and time effectiveness in the individual house-units (see for instance Ashley, 1980; Dhanekesar, 2000). For instance, in MHBPs the notion exist that, as a result of the potential effect of the learning curve experience there should

normally be, for instance, cost and time savings on house-units being delivered. This management perspective was interpreted to mean that on MHBPs there were potentially likely targets to be met on the specific house-units as well as in the overall project context. This intuition thus led to the viewpoint of discriminating between meeting “overall success criteria” (i.e. success in the larger project context) and “success criteria on individual house-units.”

Subsequently, it was contended that if property developers discriminate between the two sets of success criteria or otherwise, it should provide PMs with the information that will enable them to channel the appropriate behaviours in respect of for instance, the degree of detailing and effort required in implementing relevant management tools such as, for instance, master, detailed and short term programmes. Interestingly, this discourse is psychologically supported in the literature. For instance, Tett et al (2000) contended that the behavioural actions of managers towards achieving project success, is influenced by the degree and expected level of results. Subsequently, they argue that behaviours that might be associated with short term planning where “detailing” is very important may be different from undertaking strategic planning where “creativity” is rather more important. Thus, the behaviours and skills underlying effective short term planning (attention to detail) are likely to be different from those contributing to long term planning (creativity). It is therefore

anticipated that if PMs were aware of which success dimensions are deemed more critical in MHBPs, appropriate resources would be challenged towards acquiring the relevant competencies.

4.2.4 Framework for Project Lifecycle

The project lifecycle framework (Figure 4.4) is a pictorial concept put forward by Lim and Mohammed (1999). The premise of the framework is that as a project progresses, there may be a set of different factors influencing each phase (of the project lifecycle) towards achieving the overall success criteria. Such factors may be inherent in proxies such as feasibility studies, marketing research, data of various kinds, site conditions, weather, and logistics. In arguing their case, Lim and Mohammed (1999) identified the following project phases: conceptual, planning, design, tender, construction and operational as potential divisions for understanding the concept underlying the framework. Recently, Pillai et al (2002) have also used similar pictorial ideology in the context of engineering manufacturing projects. Subsequently, they developed a mathematical model intending to link performance measurement across three phases namely, inception, procurement and execution. While Pillai et al (2002) used the framework in a significantly different environment, there is no doubt that their interpretation reinforced the validity of the ideology in performance measurement.

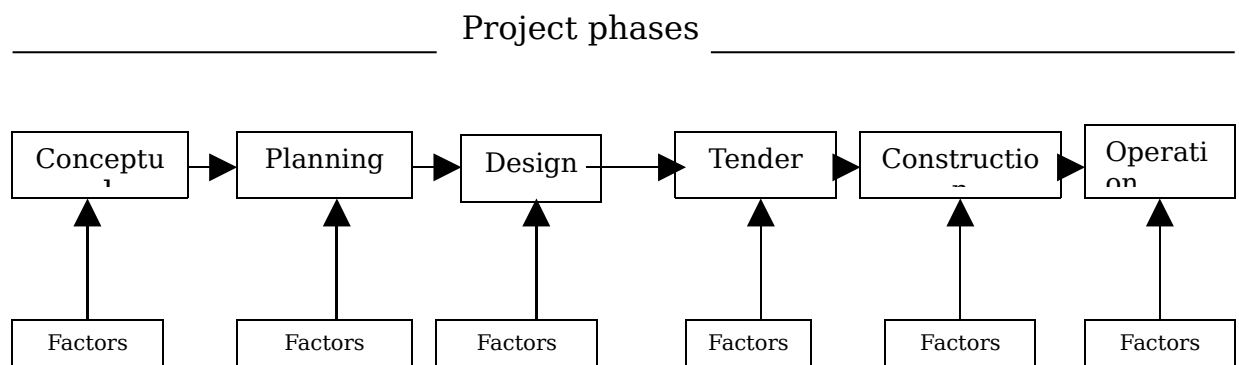


Figure 4.4: Project lifecycle framework showing how different factors may influence various phases

Source: After Lim and Mohammed (1999)

More recently Belout and Gavreau (2004) have re-affirmed the potential validity of this concept in the HRM research genre using empirical data. Adopting four project phases namely; conceptualization, planning, execution and completion, they employed pearsons' correlation and regression analysis to confirm that management support and personality related measures respectively are significantly related to project success at various phases of the project lifecycle. The relevance of this evidence in particular is, there is the likelihood that the skills and abilities required by PMs may differ depending on the project phase of the

project lifecycle (see also Ogunlana et al, 2002). Subsequently, it could be contended that the competency profiles of PMs at the various phases of a project lifecycle are likely to differ significantly from one another.

A further implication of the findings of Belout and Gavreaus (2004) is that, it should be possible to isolate the different behavioural measures that are significantly related to project success at the various phases of a project lifecycle. Without doubt, this is very relevant in the management of MHBPs given that in these projects, the PM is often engaged from the conception stage through to the operational phase (Ahadzie et al 2006a). To help incorporate the PMs' performance domain in the project lifecycle here, the six -phase framework suggested by Lim and Mohammed (1999) is adopted as it gives the opportunity to address the PMs' performance in a more detailed perspective.

4.3 DEVELOPING A ROBUST COMPETENCY- BASED CONCEPTUAL MODEL

This section introduces the development of the conceptual model that underpins the research focus. First to be described is the conceptual model that reflects the various phases of the project lifecycle. Thereafter, an abridged conceptual model for the "construction phase" is presented. The explanation for this distinction is provided in the course of the discussion.

4.3.1 A Competency-Based Conceptual Model for the Project lifecycle

The strategic position of competency-based measures in contemporary HRM cannot be overemphasised. The theoretical framework adopted, in particular, the organizational psychology theory of job performance provides the basis for developing a robust competency-based model which can be used to predict the performance of PMs (Figure 4.5). In conjunction with the conventional wisdom in the use of project success criteria, the behavioural measures could be mapped to the performance outcome. As noted earlier, adopting this perspective emphasises that behavioural competencies are not only a function of the PM but also a function of the expected project outcome (Brophy and Kiely, 2002).

With the contention that behavioural competencies are likely to develop and change as a project progresses, the model draws on the project lifecycle framework so that the potential behavioural performance of PMs can be predicted at the conception, planning, design, tender, construction and operational phases of the project lifecycle (see Figure 4.5).

Based on the evidence that individual differences in *cognitive ability*, *experience*, *job knowledge* and *task proficiency* best

predict *task performance behaviours* they have been incorporated as the constructs for each of the project phases identified. Since *task performance behaviours* usually vary between different job descriptions in the same organization, it pre-supposes that it should be possible to identify the specific competency profiles for each project phase and thus establish how significantly they are related. Thus, these constructs when operationalised were to be used for developing the appropriate independent variables for each of the project phases already identified.

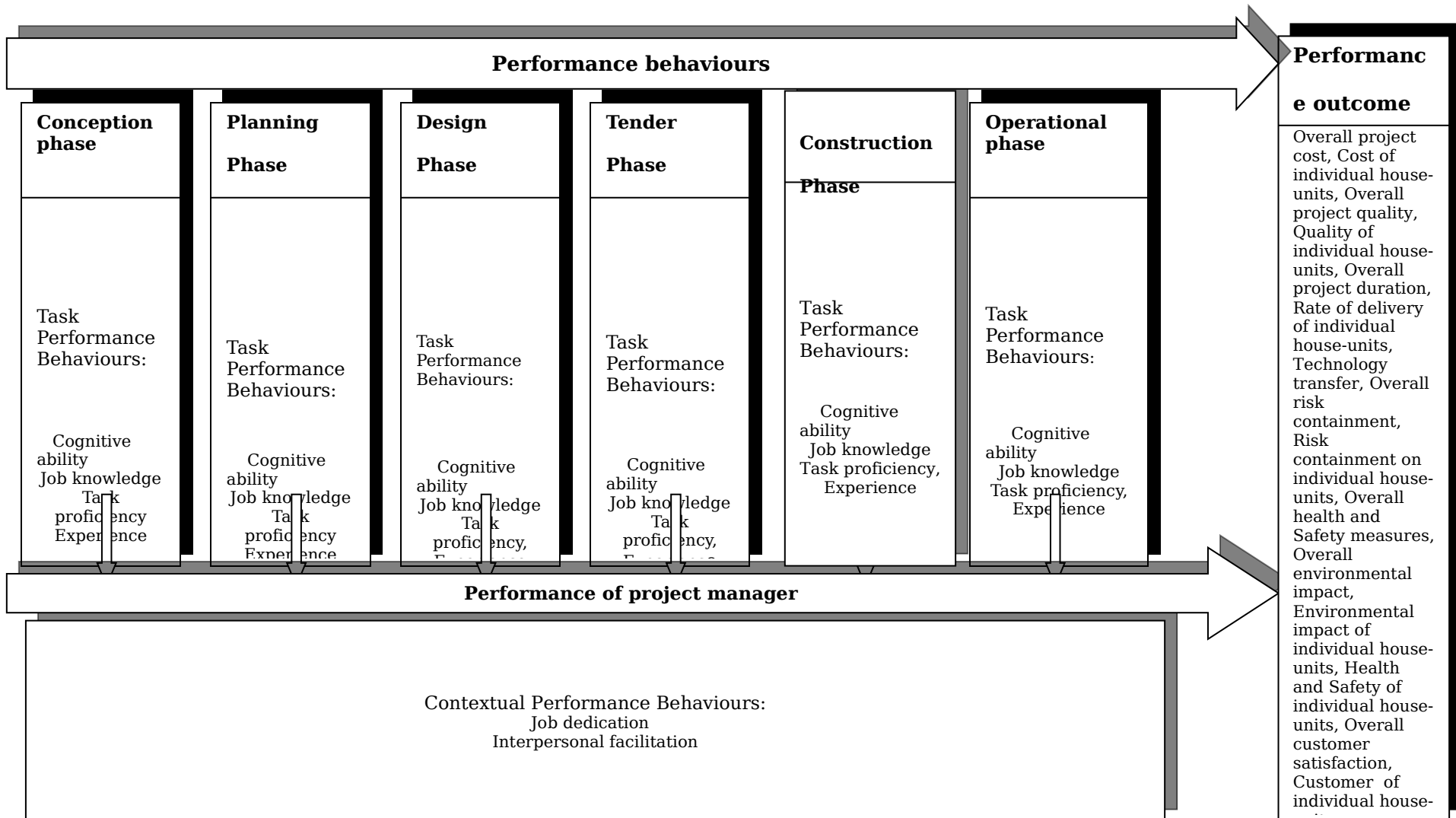


Figure 4.5: Competency-based Conceptual model for the project lifecycle of MHBPs

Source: Ahadzie et al (2006a)

Since *contextual performance behaviours* are not job specific but usually common to many jobs, it follows that, irrespective of the project phase, the PM will be expected to exhibit the same or similar types of behavioural competencies across all the phases (Figure. 4.5).

Thus, *contextual performance behaviours* might be more amenable for developing generic competency profiles of PMs. As individual differences in *interpersonal facilitation* and *job dedication* best predict *contextual performance behaviours* in managerial performance, these were adopted as the appropriate constructs. In effect, the adopted constructs of *contextual performance behaviours* represented another set of independent variables.

In respect of the performance outcome, which represents a further dimension of the overall model, the 15 potential success criteria developed for MHBPs were used and these represented the dependent variables (Figure 4.5).

This conceptual model gives opportunity for the variables to be defined in explicit behavioural terms, portrays the performance domain as multidimensional and gives the opportunity to distinguish between potentially generic and specific competency profiles. Contending that the conceptual model draws significantly on the well-grounded organisational psychology theory of job performance, it is potentially robust for identifying appropriate

management behaviours that will help encourage more superior performance throughout the whole lifecycle of MHBPs (Ahadzie, 2006c and 2006d).

4.3.2 An Abridged Competency-Based Conceptual Model for the Construction Phase

The developed project lifecycle model has the potential for developing an holistic understanding of the PMs' performance domain. However, for the purpose of this study, a decision was taken for the development of the substantive model to centre on the "construction phase" (Figure 4.6). This decision was primarily motivated by resource constraints.

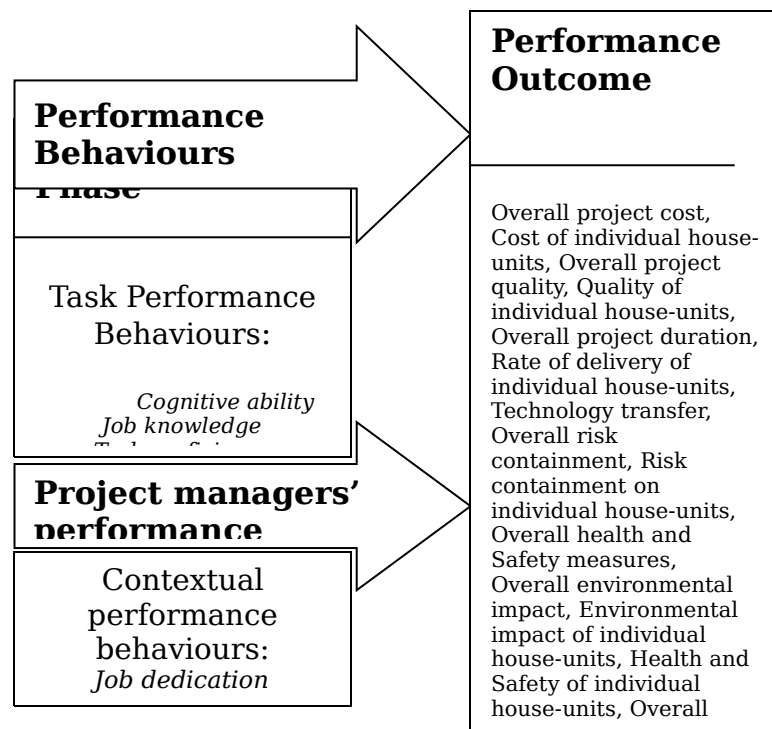


Figure 4.6: Abridged version of conceptual model at the construction phase

Source: Ahadzie et al (2006c)

The reasoning for settling on the construction phase is primarily driven by the fact that, given level of development in the management of MHBPs in Ghana presently, it is the management practices going on the construction phase which appears to be of particular interest to professionals and practitioners. Interestingly this decision to focus on the construction phase is also supported using the “person-process-product” concept in project management practice. According to Dullaimi and Langford (1999), this three- stage concept is necessary to fully understand in a wider perspective effective managerial performance in project management practice. However, in chapter three, it was revealed that while most researches in MHBPs have in the recent past focussed on the construction phase, the emphasis has also been on the “process-product” stages (Okuwogo, 1997; Odenyika and Yusif, 1998; Formoso et al, 2000). Thus, focussing on the construction phase would help provide the opportunity to address the convergence as regards the “person-process-product” relationships, so that a more holistic understanding of effective project management practice can be developed.

Nevertheless, this model at the construction phase when developed will be used to assess the potential of developing the fully completed model in the future for use by practitioners. Hence in the interim, an abridged competency –based conceptual model for the construction phase is presented to help clarify the data

collection stages of the study (see Figure 4.5). Just like the model reflecting the various phases of the project lifecycle, the abridged version purports to measure the PMs' performance by establishing the behavioural attributes that best predict performance outcomes in MHBPs. The constructs of task performance behaviours are identified as *cognitive ability*, *job knowledge*, *task proficiency* and *experience* whilst contextual performance behaviours are represented by *job dedication* and *interpersonal facilitation*. This conceptual model was used as the basis for selecting the relevant research methods and instruments as described in the subsequent chapter.

4.4 SUMMARY

Following the literature review, this chapter has treated the development of an appropriate conceptual model for reinforcing the future direction of the research. Firstly, some basic assumptions about the term "performance" were outlined. This was important to help provide a complete understanding of the terminology as used in this context. Thereafter the underlying theoretical frameworks underlying the development of the conceptual model were discussed. Three main frameworks were highlighted as critical to addressing the key research questions,

namely the organisational psychology theory of job performance, the conventional wisdom in project success criteria, in particular Pinto and Slevin's (1988) framework, and the project lifecycle framework proposed by Lim and Mohammed (1999).

Given the realisation that MHBPs differ in many ways from the one-off project often encountered in construction, it was important to explain further the dependent variables involved, which was done by developing a project success framework for MHBPs.

Drawing on these frameworks a robust competency framework was then presented. It is argued that the rigour in the conceptual model lies in its explicit focus in both performance behaviours and outcomes and also being linked to the project lifecycle. Subsequently and as a result of resource constraints placed by on the research, the development of the substantive model will focus on the construction phase.

Hence an abridged version of the conceptual model for the construction phase was also presented. The next section now describes the research methodology adopted for the study.

CHAPTER FIVE

CHAPTER FIVE: RESEARCH METHODOLOGY

5.0 INTRODUCTION

This chapter now discusses the research methodology adopted for the study. The research methodology involves the systemic rules and procedures upon which this research agenda is based and against which the data collected is interpreted and the findings evaluated. In the ensuing discussion, the terms epistemology, methodology and methods as applied in research are first defined. Thereafter, (and also informed by the conceptual model in chapter four) the paradigm adopted is described. This is then followed by a commentary on the choice of the method including the research instrument design.

The data collection procedure is also described in this chapter. Subsequently, the relevant information on the potential respondents, the sampling frame, the sample size and the field work are presented. The chapter concludes with a commentary on how the data collected was edited and analysed.

5.1 EPISTEMOLOGY, METHODOLOGY AND METHODS

The lack of an integrated theory of project management is reflected in its multifaceted and multi-disciplinary nature, and for this reason, research in project management practice often draws on a range of theoretical bases from the social and natural sciences (Soderland, 2004; Smyth and Morris, 2007). This diversity of theoretical bases makes it quite problematic for researchers in project management practice to articulate explicitly the choice of an appropriate research methodology (ibid). To avoid “controversial” criticism and doubts about a research, there is therefore the need for a thorough understanding of the application of the concepts underlying the epistemological, methodological and methods reflected in the research (Pollack, 2007; Smyth and Morris, 2007).

Epistemology is used to define the knowledge through which the research process is investigated and developed (see Smyth and Morris, 2007). Alternatively, methodology is enshrined in the philosophy of the research process (Bailey, 1987; Smyth and Morris, 2007). Thus, methodology includes the assumptions and values that becomes the rationale for the research including the standards or criteria for interpreting data and reaching conclusions (Bailey, 1987). In contrast, methods refer to the tools or techniques for undertaking the specific research (Bailey, 1987; Smyth and Morris, 2007). Figure 5.1 presents a conceptual interpretation of the application of epistemology, methodology and methods in a typical research agenda

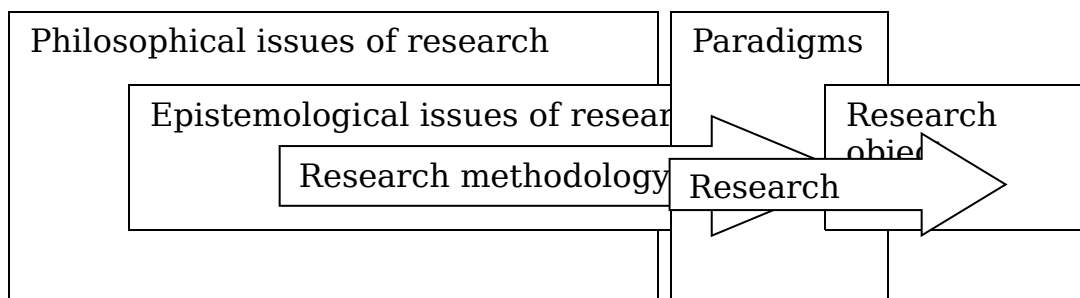


Figure 5.1: Applying epistemological, methodology and methods
Source: After Smyth and Morris (2007)

Figure 5.1 demonstrates that the research methodology is embedded in the epistemological issues, which as shown is also embedded in the wider philosophical issues of the research. Together these can be “manipulated” based on the research context to establish the appropriate paradigms and research methods suitable for the research. In particular, the paradigm adopted will help in the choice of an appropriate research methodology (Bailey, 1987).

5.2 CHOOSING AN APPROPRIATE RESEARCH METHODOLOGY

The methodological paradigms are first elucidated (5.1.1). The paradigm adopted for this research is then described (5.1.2). Subsequently the research methodology adopted is explained.

5.1.1 Methodological Paradigms

According to Pollack (2007), the term paradigm generally refers to *“a commonly shared set of assumptions, values and concepts within a community, which constitutes a way of viewing reality.”* In particular, paradigms shape the way researchers perceive the research methodology adopted and the techniques to be used (Pollack, 2007; Smyth and Morris, 2007). Subsequently for this purpose paradigm is defined as:

“a research perspective or view (a school of thought) that holds views about what research goals and methods are appropriate (how research should be conducted) and has its own values and assumptions.” (Bailey, 1987)

Two main research paradigms are in popular use especially in social science related research such as this type (Bailey, 1987). These are: positivism which assumes that social phenomenon obeys natural laws and can be subjected to quantitative logic and interpretivism which argues that social phenomenon does not obey natural laws but is interpreted based on peoples' conviction and/or understanding of the realism surrounding the phenomenon (Bailey, 1987; Walliman, 2003). In practice the difference between the two traditions is influenced by the ontological, epistemological and axiological assumptions underlying the research (Keraminiyage et al, 2005) (Figure 5.2 below).

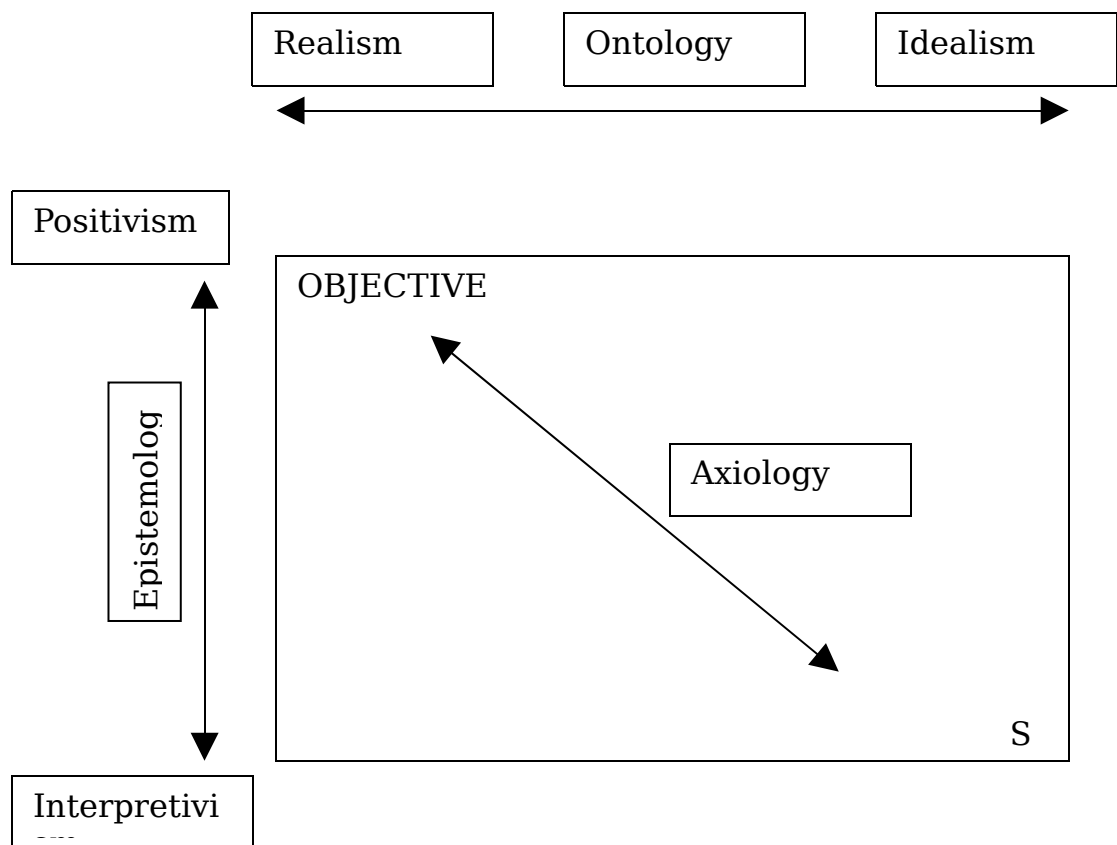


Figure 5.2: Dimensions of Research Philosophy

Source: Adopted from Pathirage (2005)

As noted earlier the epistemological question drives the relationship between the researcher and the subject under investigation. In addition, it provides the knowledge base that the researcher can use to investigate the relationship under consideration (Liyarange et al, 2005). Thus, depending on the epistemological positioning adopted by the researcher, positivism or interpretivism would prevail as more suitable (Figure 5.2). The ontological assumption deals with the nature of reality (Johnson and Duberly, 2000) or idealism (Gummesson, 1991) influencing the phenomenon. Whereas realists view the research reality with a pre-determined structure, idealists adopt the view that different

observers may have different perceptions (Pathirage et al, 2005). Alternatively, axiology deals with whether the research philosophy surrounding the reality is “value free” or “value driven”. In value free research, the choice of what to study or how the study can be examined by objective criteria whilst value laden is driven by subjective criteria (see for instance Easterby-Smith et al (2003) cited in Pathirage et al, (2005).

Table 5.1 provides further contrasting implications of the choice between positivism and interpretivism. Whereas in positivism, the observer or unit of analysis is often not part of what is being investigated, in interpretivism, the observer has to be part of the research process. Similarly whereas in positivism, human interest is largely irrelevant because it is not the main subject under investigation, in interpretivism human interest is the main driver of the science. Furthermore with regard to positivism, the concepts need to be operationalised so that they can be measured, however with regard to interpretivism, the stakeholder interest has to be incorporated. Above all, while positivism may require relatively large sample size to draw statistical conclusions, with regard to interpretivism the concentration is normally on small samples to help develop theoretical abstraction.

Table 5.1: Contrasting implicatons of positivism and interpretivism

	Positivism	Interpretivism
The observer	Must be independent	Is part of of what is

Human interests	Should be irrelevant	being observed Are the main drivers of the science
Explanations	Must demonstrate causality	Aim to increase general understanding of the situation
Research progress through	Hypothesis	Gathering rich data from which ideas are induced
Concepts	Need to be operationalised so that they can be measured	Should incorporate stakeholder perspectives
Unit of analysis	Should be reduced to simplest terms	May include the complexity of whole situations
Generalisation through	Statistical probability	Theoretical abstraction
Samples required	Large number selected randomly	Small numbers of cases chosen for specific reasons

Source: After Keraminiyage (2005)

In project management practice, the terms “soft” and “hard” paradigms are often associated with these two entrenched traditions (see Pollack, 2007; Smyth and Morris (2007). The hard paradigm is associated with positivist epistemology, deductive reasoning, quantitative or reduction techniques and attributes which are often associated with rigour and objectivity.

Alternatively, the soft paradigm is commonly qualitative and emphasises subjective relevance rather than objectivity (ibid). Subsequently, project management research practice based on the hard paradigm tends to emphasise efficient, expert-led delivery, control against predetermined goals and interest underlying problem solving while the soft paradigm emphasises learning, participation, the facilitated exploration of projects, and typically demonstrates an interest in underlying social process or structure (Pollack, 2007). Figure 5.3 is used to explain the theoretical and

practical differences between the two paradigms as perceived in project management practice.

	Hard	Soft
Theory	Postivist/re alist	Intrepretivi sm
Practice	Problem solving	Problem structuring

Figure 5.3: The hard and soft paradigm in theory and practice

Souce: Pollack (2007)

The main criticism against the use of the hard paradigm in project management research is that it is based on the “Humean Law of causality” (i.e. linear thinking) when the discipline is in fact open-ended and requires lateral thinking (Smyth and Morris, 2007). Equally, a major criticism against the soft paradigm (which leans towards lateral thinking) is that because the reseacher is often an integral part of the research instrument, the question of “reliability” especially, should someone else decide to replicate the study becomes difficult (see for instance Openhiem 1992).

Presently, the evidence suggests that the hard paradigm has become entrenched in many aspects of project management research, albeit it must be said that, in practice these paradigms are not mutually exclusive. As a matter of fact, many researchers nowadays use parts of both approaches (i.e. by taking advantage of the strength of each), and the difference lies in the degree of emphasis. In this research, time and financial constraints would not allow both paradigms to be explored and so the paradigm, which was considered most reasonable in satisfying the tenets of the research agenda was chosen.

5.1.2 The Research Paradigm Adopted

The research phenomenon under consideration and the key research questions influence the type of paradigm that has to be adopted (Remenyi et al, 1998; Pollack, 2007). The conceptual model is also strategic in deciding which paradigm to follow (Miles and Huberman, 1994). Moreover, the conceptual model also forces the researcher to be rational and systematic about the constructs and variables to be included in the research instrument.

In chapter two (section 2.4), it was noted that human behaviour albeit complex is relatively enduring and stable over time. Subsequently, although researchers recognise the complexity involved in measuring behavioural competencies, there is still a general consensus that by considering the contribution of an individual's behavioural action over a period of time, it should be

possible to scale the degree to which they are desirable with enough precision to distinguish between them (see e.g. Motowidlo et al, 1997; Gellatly and Irving, 2000, Larson, and Buss, 2005). Indeed McCloy (1994) buttresses this view by arguing that despite many criticisms that quantitative logic or modelling might sometimes be unreliable and also vulnerable to numerous sources of distortion in measuring human behaviour, they remain reasonably valid and reliable for predicting human performance (see also Borman, 1978; Murphy et al, 1982; McCloy et al, 1994; Borman et al, 1995). That is, while the method of collecting data might differ depending on research focus and resources available, virtually all studies the researcher has come across in mainstream HRM publications including project management practice have been largely subjected to quantitative analysis.

Thus, notwithstanding any potential limitations of quantitative logic in estimating behavioural measures, there is reasonable evidence to suggest that it has over the years stood the test of time and might therefore be appropriate for this research agenda as well. Therefore and also for the purposes of establishing methodological validity for the type of research being undertaken, the hard paradigm was adopted. The usefulness in adopting the hard paradigm in this study is that it should make it possible to establish the convergent and discriminant validity of the study in relation to the relevant literature. As a result, by adopting the hard

paradigm, it should reasonably be possible for the study to be replicated with relative ease if necessary.

5.2 THE RESEARCH METHOD

In principle, there are many research methods (instruments) for satisfying various research needs (Wilkinson and Birmingham, 2003). The irony is that while there are indeed many research methods, there is no option per excellence (ibid). Nevertheless, some instruments are better suited for tackling specific issues than others. In good research, the contention is that the choice should be appropriate, reasonable and explicit (Denscombe, 2003). Ignoring these fundamentals can lead to very poor research. Above all, this may open the research findings to criticisms and doubt (Denscombe, 2003).

By adopting positivism as the paradigm underpinning this study, the epistemological, ontological and axiological assumptions dictated that either; case studies, surveys and experiments would be most ideal as the research method (Figure 5.4). However, experiments would not be an appropriate choice because they are carried out usually in a laboratory setting where the investigator can manipulate behaviour directly, precisely and systematically (Yin, 2003). Thus, in view of the nature of investigation associated with this research, experiment was discounted as an appropriate option. In surveys, samples are examined through questionnaires

while case studies involve an empirical enquiry that investigates a contemporary occurrence within a real life context (Yin, 2003).

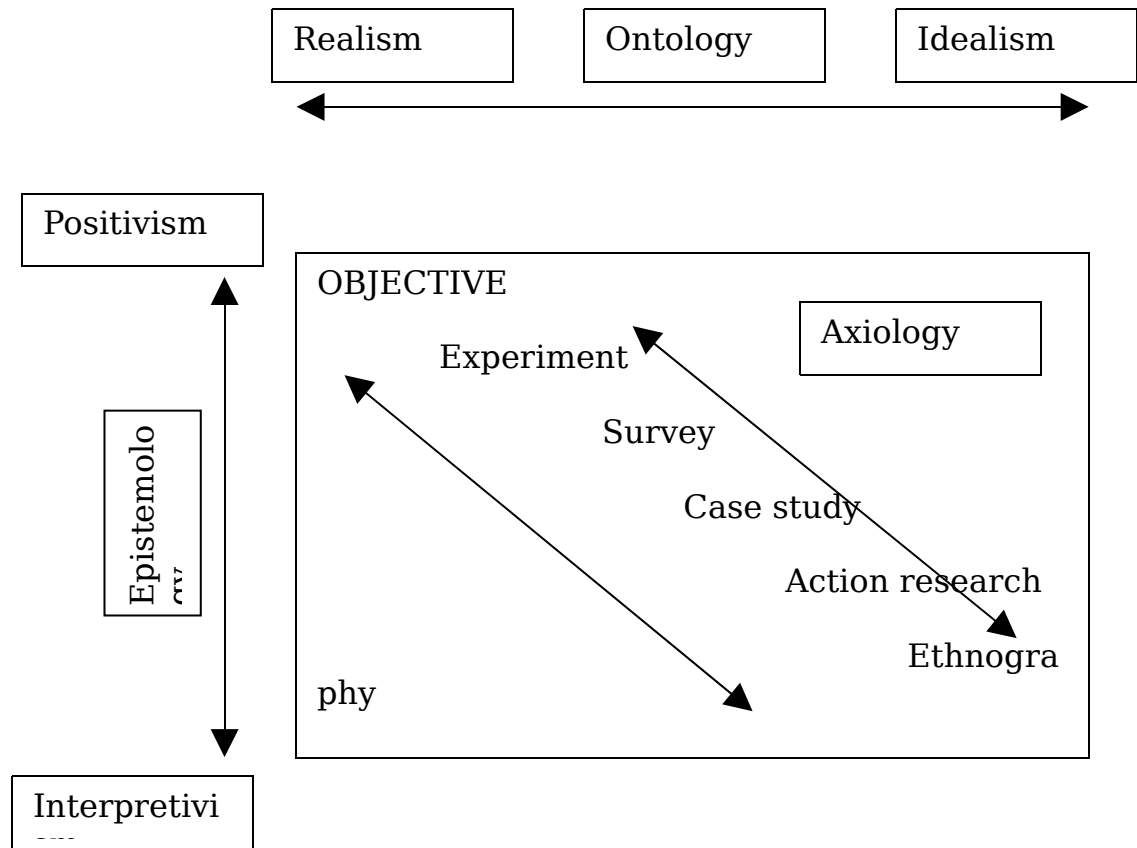


Figure 5.4: Influence of Research Philosophy on the choice of research instruments

Source: After Pathirage (2005)

In order to choose between these two research methods, (i.e. case studies and surveys), the research questions were also drawn upon by referring to the framework in Table 5.2. This framework provides the potential of matching research questions to the choice of potential research instruments. The key research questions involved in the study suggested that either surveys or case studies could have been suitable as the research method.

However, the theoretical basis of this study involved collecting data to draw deductive conclusions and this would have been practically unjustifiable given that the case study approach is more amenable for establishing inductive reasoning or theory building. In view of this a survey technique was chosen as the most appropriate research method. The survey instrument comprises the postal questionnaire survey used in evaluating aspects of the output of the results or the validation exercises and this is described in section 5.3.6.

Table 5.2: Cross-categorisation and matching of research question type and research strategy.

Strategy	Type of Research Question	Is control of behaviour required?	Is there focus on contemporary events?
Experiment	How? , why?	Yes	Yes
Survey	Who? , What? , Where? , How Many? , How much?	No	Yes
Archival Analysis	Who? , What? , Where? , How Many? , How much?	No	Yes/No
History	How? , Why?	No	No
Case study	How? , Why? What?	No	Yes

Source: After, Bailey, 2005 and Chinyio, (1999)

5.2.1 Presenting the Survey Instrument

This introductory section presents an overview of the survey instrument. Full details are given in section 5.2.2 (see also Appendix 4). Drawing on the constructs identified in the conceptual model (i.e. Figure 4.4), the appropriate dependent and

independent variables for the survey instrument were operationalised. Table 5.3 presents the details of the operational measures involved including the rationale and how they were to be analysed once the data had been collected. Before operationalising the key constructs, an extensive review of the taxonomy of generic managerial skills in the HRM genre including construction was undertaken (see Appendices 1, 2 and 3). The aim was to help identify, in particular, the key human skills that are useful for operationalising the performance of PMs in a study like this. This was to make sure that all the necessary behavioural skills had been captured towards making the operational measures rigorous. Appendices 1, 2 and 3 provide details of the common human skills.

The principal concept that influenced the design of the operational measures was that they should either directly or indirectly be associated with behaviours that largely reflect management intuition in repetitive planning and construction techniques. Management intuition in repetitive construction planning as used in this sense means that in MHBPs the PM is expected to introduce planning and scheduling model that will:

- Maintain continuous flow of work for all identifiable crew involved in the repetitive task involved in MHBPs

- Ensure continuous flow of all resources including their allocation and levelling, and
- Allow time and cost efficiencies by appropriate balancing of crew through the opportunity of experience and learning curves effects on production

Thus, in MHBP's the onus is on the PM to evaluate all these feasible trade-offs in order to select a management plan that strikes an optimal balance between minimising the project cost and time and maximizing crew work continuity (Hyari and El-Rayes. 2005). As much as possible the operational measures were designed to capture this intention, by where necessary, drawing the respondents' attention to the significance of repetitive planning techniques in the wording of the questions.

Robbins (1998) has noted that one of the key issues in addressing the performance measurement is to establish the person who is to determine the criteria for evaluation. In this vein, Strunckenbach (1987) who is in agreement with Robbins (1989) suggests that in project management practice, the important stakeholders who could be considered for determining the criteria are the PM, project-team members, "top management" and the customer. Conversely, some researchers argue that customers are often likely to focus on outturn performance rather input based measures and can therefore not be relied upon very much for developing

competencies measures. (cf. Dainty et al, 2003). Indeed, given that a key objective of this study was towards improving the competencies of PMs, one could argue that the unit of analysis should have been the PMs who could provide reasonable information on what is best suited for their own professional development (cf. Robbins, 1989). Alternatively, a potentially plausible approach might have been to use the 360 degrees or interrater assessment of managerial performance, as this would have helped in developing the competencies from a broader perspective (Harris and Schaubroek 1988; Robbins, 1989).

However, (and as already mentioned in the general introduction), the main motivation here was to help provide potential and aspiring PMs a clear understanding of what their superiors herein referred to as managing directors (MDs) expect of them in terms of the appropriate competencies. Indeed Brown and Adams (2000) have implied that the whole essence of project management practice is for the PM to deliver the project to meet the objective of the primary stakeholder whose financial investment is at risk in the business venture. Pickett (1998) has also noted that; *"the current and future success of an enterprise is a reflection of the effectiveness of the senior team, their vision and leadership, and combined knowledge and skills of the organisations workforce."* This suggests that the identification of the management and specialist competencies that will enable construction organisations such those involved in MHBPs to meet the demands of the future

might be assumed to be the key responsibilities of “top managers” such as senior business executives or MDs whose investments are often at stake in these economic ventures. Furthermore, by providing PMs a clearer understanding of what the MDs expect of them, this would potentially pave the way both parties PMs to come to an agreement and avoid differences in respect of what constitutes the determinants of superior managerial practices in the implementation and management of MHBPs. To this effect, aspiring PMs who lack the requisite skills expected of them by the MDs (who are also their potential employers) would hopefully strive to acquire the relevant skills towards generating an healthy working environment while for those who possess the necessary skills, it might give give them the impetus to aim higher towards satisfying the expectations of property developers.

In Ghana, the MDs of housebuilding companies who constitute members of the Ghana Real Estate Developers Association (GREDA) are responsible for taking the corporate and projects decisions affecting their organisation and also employing the services of PMs (see also section 5.3.1). It was therefore decided to target these MDs to help elicit the relevant measures that would help identify and develop the core competencies that align with their corporate and project objectives. Subsequently, the survey instrument was designed having in mind what the MDs would consider important for evaluating the performance of PMs based

on their retrospective judgment of regularly observing the PMs perform on MHBPs.

5.2.2 The Survey Instrument Design

There are three main parts to the survey instrument plus a preamble that explains the purpose of the research, the expected outcome and how the findings are to be disseminated including feedback to the participants (see Appendix 4) (See also Table 5.3 for details of the various sections involved). For convenience and simplicity, the preamble is not treated as part of Table 5.3. However details can be found in Appendix 4. The substantive parts of the instrument are as follows:

5.2.2.1 Demographic

Aside the preamble, the first part of the survey instrument contained demographic information related to the classification of the participants; how long they have been in business; the type of MHBPs they have implemented over the years; the overall value of MHBPs executed in the last five years. This background information was needed in order to establish the potential credibility of the data.

Given the descriptive nature of the data that was being sought in this section of the survey instrument, descriptive statistics, (mainly percentages) were to be used to make meaning out of the data.

Apart from the demographic data, information was also gathered from the property developers on their perception of the performance of PMs that they have “recently” engaged on MHBPs (Appendix 4). This exploratory information was required to help give some insight into how the property developers (constituting the sample) perceive the performance of PMs in MHBPs in Ghana. Because it was not intended to generalise this information, this standardised opinion was also analysed using descriptive analysis.

5.2.2.2 Criteria for Performance Outcome (dependent variables)

The second part of the survey instrument sought to elicit information on the criteria (i.e. the dependent variables) the participants considered important for assessing the success of MHBPs. The 15 potential success criteria identified in the success framework for MHBPs in chapter four (section 4.2.2) were used for this purpose (Table 4.1 and Figures 4.4, 4.5 and 4.6).

Having decided on the dependent variables, Likert rating scales was adopted to help elicit the appropriate ratings. Likert rating scales are one of the most useful psychometric scaling for establishing behavioural or attitudinal measures (Carmin and

Irvine, 1988). The conventional five-point rating scale was used as the evidence suggests that more complex scoring systems possess no significant advantage (Oppenheim, 1992). Subsequently, the dependent variables were to be ranked per their level of importance by the potential respondents (i.e. managing directors of property developers who belong to the GREDA) on a five-point Likert rating scale of 1-5, where 1= not very important, 2= not important, 3= average, 4= important and 5= very important. While Likert rating scales are often described as ordinal measures, they can be assumed as interval measures if the spacing between them is uniform (Blaikie, 2003). In this sense, statistical tools such as the t- test and factor analysis could then be used to analyse the dependent variables so that they could be incorporated into the development of the substantive model.

5.2.2.3 Contextual performance behaviours (independent variables)

The third part of the survey instrument sought to elicit information on the contextual performance behaviours representing the first dimension of independent variables (Table 5.3). These independent variables were operationalised from the constructs *job dedication* and *interpersonal facilitation*. A total of 14 independent variables were operationalised. Six operational measures were identified under *job dedication* and eight operational measures were identified under *interpersonal facilitation* (Table 5.3). These *contextual performance behaviours* were to help elicit the

appropriate behavioural measures that might be important towards enhancing the necessary social/psychological environment in which the technical functions relating to MHBPs are implemented. It is common that in MHBPs, a lot of inter-related activities might be on-going on simultaneously involving a number of different gangs or works contractors. The wording of the questions were designed to mainly address behaviours that PMs are expected to display out of volition and disposition towards engendering harmony at the various “multiple” sites. Subsequently, some of the questions included the PMs’ time management practices on multiple projects; the PMs’ persistence in seeing to works being completed according to schedule; ease with which the the PMs is approachable by works contractors with their personal problems, the PMs ability to provide effective solutions to conflict while maintaining good relations.

Table 5.3: Abridged Version of Operational measures for Research Instrument

Demographic	Dependent variables	Independent variables
<ul style="list-style-type: none"> How long have you been a member of the Ghana Real Estate Developers Association? Please indicate how long you have been involved in the construction of MHBPs Please indicate the overall value of MHBPs you have executed in the last 5 years Would you please indicate which of the following types of MHBPs you often undertake? Would you please indicate the average number of (quantity) of house-units you often undertake in MHBPs? <p>Performanne level:</p> <p>What is the pereception of the performance outcome of PMs you have engaged in MHBPs in recent times</p>	<ul style="list-style-type: none"> Overall project cost Cost of individual house-units Overall project duration Rate of delivery of individual house-units Project quality Quality of individual house-units Overall Customer satisfaction Customer satisfaction on individual house-units Overall Risk containment Risk containment on individual house-units Overall Environmental impact Environmental impact of individual house-units Overall health and safety measures Health and safety measures on individual house-units Technology transfer 	<p>Contextual performance behaviours:</p> <p><i>Job Dedication</i></p> <ul style="list-style-type: none"> Perseverance in pushing works contractors and/or artisans to achieve overall project objectives. Persistence in pushing works contractors and/or artisans to overcome obstacles. Dedication to helping works contractors and/or artisans to achieve all programmes Ability to adapt/make the best out of difficulties faced by works contractors and/or artisans at project sites Developing a sense of conscientiousness towards works contractors and/or artisans. Commitment towards meeting overall project objectives <p><i>Interpersonal Facilitation</i></p> <ul style="list-style-type: none"> Effective time management practices on all project sites. Providing timely information for works contractors and/or artisans. Volunteering to help works contractors and/or artisans solve personal problems Showing compassion and sensitivity towards problems faced by works contractors and/or artisans. Ease with which works contractors and/or artisans are able to approach project manager with their problems. Ability to arrive at effective solutions to conflict while maintaining good relationships. Being aggressive on works contractors and/or artisans towards achieving project objectives. Being honest with works contractors and/or artisans on their performances. <p>Task performance behaviours:</p> <p><i>Cognitive ability</i></p> <ul style="list-style-type: none"> Ability to envisage problems on all house-units under construction. Ability to provide alternative solution to problems encountered on all house-units under construction. Ability to maintain emotional stability when dealing with problems on all house-units under construction. Ability to recall progress of works on all house-units <p><i>Job Knowledge</i></p> <ul style="list-style-type: none"> Knowledge of appropriate construction technology for repetitive works. Knowledge of appropriate cost saving techniques for repetitive construction works. Knowledge of appropriate labour management techniques for repetitive construction works. Knowledge of appropriate programme for delivering repetitive construction works Knowledge of appropriate quality management techniques for repetitive construction works.

Demographic	Dependent variables	Independent variables
		<ul style="list-style-type: none"> • Knowledge of appropriate site layout techniques for repetitive construction works. • Knowledge of appropriate progressing techniques for monitoring repetitive construction works. • Knowledge of appropriate materials management system for repetitive construction works. • Knowledge of appropriate health and safety issues for repetitive construction works. • Knowledge of appropriate risk management measures for repetitive construction works. • Knowledge of appropriate environmental impact assessment for repetitive construction works. • Knowledge of appropriate technology transfer for repetitive construction <p><i>Task proficiency</i></p> <ul style="list-style-type: none"> • Technical quality of scheduling programme for delivering overall house-units. • Functional quality of scheduling programme for delivering overall house-units. • Technical quality of scheduling programme for delivering individual house-unit. • Functional quality of programme for delivering individual house –unit. • Technical quality of cash-flow programme for the construction of overall house-units. • Functional quality of cash-flow programme for the construction of overall house-units. • Technical quality of cash-flow programme for the construction of individual house-units. • Functional quality of cash-flow programme for the construction of individual house-units. • Technical quality of specifications provided for the construction of overall house-units. • Functional quality of specifications provided for the construction of overall house-units. • Technical quality of specifications provided for the construction of individual house-units. • Functional quality of specifications provided for individual house-units. • Technical quality of programme for achieving overall customer satisfaction. • Functional quality of programme for achieving overall customer satisfaction. • Technical quality of programme for achieving customer satisfaction on individual house-units. • Technical quality of risk containment programme for the construction of overall house-units. • Functional quality of risk containment programme for the construction of overall house-units. • Technical quality of risk containment programme for the construction of individual

Demographic	Dependent variables	Independent variables
		<p>house-units.</p> <ul style="list-style-type: none"> • Functional quality of risk containment programme for the construction of individual house-unit • Technical quality of environmental assessment programme for the construction overall house-units. • Functional quality of environmental assessment programme for the construction of overall house-units. • Technical quality of environmental assessment programme for the construction of individual house-units. • Functional quality of environmental assessment programme for the construction of individual house-units. • Technical quality of health and safety measures for the construction of overall house-units. • Functional quality of health and safety measures for the construction of overall house-units. • Technical quality of health and safety measures for the construction of individual house-units. • Functional quality of health and safety measures for the construction of individual house-units. <p><i>Experience</i></p> <ul style="list-style-type: none"> • Experiences in managing MHBPs. • No. of years of practice in construction. • Experiences in achieving success in the management of MHBPs. • Experiences in managing MHBPs of similar nature. • Experience in any type of construction project. • Membership of appropriate professional body.

Just like the dependent variables, these independent variables were also to be ranked on the five-point Likert rating scale on their level of importance for predicting the performance of PMs in MHBPs. However (unlike the dependent variables), these independent variables were to be analysed directly by incorporating them into an appropriate regression model.

5.2.2.4 Task performance behaviours (independent variables)

Task performance behaviours represented another dimension of the independent variables. Here, these operational measures were operationalised from the constructs, *cognitive ability*, *job knowledge*, *task proficiency* and *experience* identified. Four operational measures were identified under *cognitive ability*, 12 under *job knowledge*, 28 under *task proficiency* and six under the construct, *experience* (Table 5.3). In effect, a total of 50 variables were identified to represent this dimension of the independent variables. *Cognitive ability* as mentioned already is a measure of the PMs' intelligence and how easily they are able to recall and solve problems. It was anticipated that identification of this (cognitive) measures may help focus the PMs' attention on developing the appropriate mental capacity expected of them by property developers in MHBPs.

Just like the dependent variables the operational measures in this section were as much as possible designed to capture the intention of management intuition in the application of the repetitive management techniques. Subsequently, in considering the operational measures for the construct *job knowledge* for instance, the key wording repetitive techniques was used as much as possible hoping that it helped the respondents to reflect on the concept while responding. Some of the questions thus read “the PMs job knowledge in appropriate construction technology for repetitive construction works”, “the PMs knowledge of appropriate cost saving techniques for repetitive construction works”, “knowledge of appropriate programme for delivering repetitive construction works”(see Table 5.3 for further details).

The same argument above applies to the construct *task proficiency* which was designed to capture the technical and functional quality of work programmes for the implementation of appropriate knowledge and skills. The premise here is that technical and functional quality associated with a task can be used to establish the sort of behaviour that goes into executing the task (see Tett et al, 2000; Ling, 2002). Technical quality is defined as a measure of the effort that goes into the preparation of the work programmes whilst functional quality is a measure of how effective or workable the programme is (see for instance Ling, 2002).

With respect to the construct *experience*, the idea was that, the kind of experience a person holds can be used to indirectly predict what kind of behaviour he/she is likely to exhibit in future. For instance, Dullaimi and Langford (1999) argued that, the job environment does influence the type of behavioural skills PMs acquire for their future development. Subsequently, PMs associated with particular project experience, are likely to conceptualise certain kinds of behaviours they have acquired and are more likely to repeat such behaviours on similar projects. Thus in this instance, the variables were operationalised to help establish whether the property developers consider experience gained working specifically on MHBPs to be more important than say experience gained on say general construction works. Similarly, it was important to establish whether experience gained specifically on MHBPs was considered more important than others and if that experience influenced the property developers' judgment of the PMs behavioural performance.

However, it should pointed out here that while there is compelling evidence to suggest that *experience* is an important construct for assessing the the job potential of individuals (see for instance Ogunlana et al, (2002) particularly in a recruitment and selection process, here the construct is viewed in terms of its potential effect on the judgment of property developers in respect to the PMs performance on the ongoing (i.e. present) job or task and not as seen on the "labour market" for the purposes of recruitment

exercises. This explanation is important for the purpose of the interpretation of the findings in pages 201-204

Given, the potentially complex nature of behavioural measures, a large number of independent variables were identified for ensuring that all the possible variables had been accounted for. This is important for the potential reliability of the measures (see for instance Hinkle, 1979; Ones and Viswesvaren, 1996). Reasonable care was taken to ensure that the content of the operational measures reflected what is typical in HRM practices. In particular, the theoretical constructs adopted informed the design of the measures to ensure that they reflected sound theoretical basis.

5.2.3 Ethical Considerations

According to a dictionary definition, to be ethical is to conform to accepted professional practices (Webster, 1968 cited in Bailey, 1987). Despite the recognition to adhere to reasonable ethical practices in research, it is believed that it is only within the last 20 years that a systematic attempt has been made to codify and clarify these standards in print (Bailey, 1987; Micthell and Jolley, 1988). In conforming to the established trend, the University of Wolverhampton (UoW) has put in place a rigorous ethical validation procedure to assist researchers conform to a reasonably

accepted standard. Among others the code designed by the UoW is to ensure that:

- There is no interference with participants' physical and psychological well-being.
- The research procedure is not likely to be stressful or distressing
- The research materials are not sensitive, discriminatory or inappropriate
- The research design is sufficiently well-grounded so that the potential participants' time is not wasted during the data collection.

The research instruments used for this study were subjected to UoW ethical research committee. In so doing, the following parameters in respect of the instrument had to be explained and justified where necessary: the rationale for and the expected outcome of the study; details of methods, materials, designs and procedures; details of how information would be held and disposed and details of how the results will be fed back to the participants. Having addressed and satisfied these criteria in a formal application, the UoW ethics committee granted permission for the field work to commence.

5.3.3 Pilot study

Prior to the major survey, a pilot survey was undertaken in Ghana. The pilot study is a trial run that can help the researcher to smoothen out the survey instrument to ensure that the participants in the main survey experienced no difficulties in completing it (Bell, 1996 cited in Moore and Abadi, 2005). The aim of the pilot study was to test the wording of the questionnaire, identify ambiguous questions, test the intended technique for data collection and measure the effectiveness of the potential response.

Using purposive sampling techniques, 10 property developers who are managing directors of their respective companies were identified from the registered list of the Ghana Real Estate Developers Association (GREDA) for the pilot study. All 10 property developers who were first contacted by phone on their willingness to participate in the pilot survey were selected based on their track record in successfully implementing MHBPs in Ghana in recent times. This included one property developer credited to be a pioneer in project management practices in MHBPs in Ghana (see Ahadzie et al, 2004). It is worth noting that the 10 participants identified for the pilot study were thereafter not included in the main survey.

The pilot questionnaires (fully addressed) were sent by e-mail to a reliable contact person at the Dept of Building Technology, Kwame Nkrumah University of Science and Technology (KNUST), who made arrangements for delivery and retrieval in person. The

questionnaires were accompanied by a covering letter explaining the purpose of the pilot study. Subsequently, the respondents were asked to critically appraise the questions and provide feedback as to the relevance and sensitivity of the questions, length and time for completing and suggestions for improvement. Within a period of three weeks, all 10 completed questionnaires were retrieved by the contact person and then posted back (by registered mail) to the UK (taking two weeks for delivery).

The pilot study was a useful exercise, particularly with regard to gathering information on issues such as average time required to complete the questionnaire, clarity of ideas and questions asked and their relevance to the construction industry in Ghana. A careful scrutiny of the completed questionnaire indicated that, the substantive questions were all answered by the respondents, suggesting that, the response categories were clearly signposted to facilitate ease of completion; relevant to the central theme and potentially interesting. It is interesting to note that when respondents were asked to make general comments for improvement, three made suggestions relating the role of the PM in auditing design and putting in place effective payment systems for works contractors. These are issues relating to the design and procurement stage and thus outside the scope of this thesis. However, it does emphasise the contention of the author that PMs' performance measures should ultimately be linked to the various project phases of the project lifecycle. Generally the feedback

was very helpful and suggested that the survey instrument was likely to work in the manner intended. A preliminary analysis of the data also gave the opportunity to test the intended technique for analysing the data and this was quite a useful exercise.

5.3 DATA COLLECTION

This section introduces issues relating to the collection of data and is grouped into five sub-sections. Section 5.3.1 addresses how the potential respondents for the main survey were identified. This is followed by a description of the sampling frame in section 5.3.2. The method for choosing the appropriate sample size is then discussed in section 5.3.3. The penultimate section (5.3.4) comments on the fieldwork whilst the final section (5.3.5) deals with how the collected data received were edited to prepare them ready for analysis.

5.3.1 Introducing the Survey Participants

As hinted earlier in section 5.2.1, the potential respondents for the study were drawn from members of the Ghana Real Estate Developers Association (GREDA). The primary business of the GREDA members (as previously indicated) is the construction of MHBPs for which they are recognised by the Government of Ghana (GoG). The fact that the GREDA members specialise in the construction of MHBPs is important viz. the critical incident

concept (CIC) associated with performance evaluations. The CIC is based on the premise that people who are aware of the aims and objectives of a job and who observe such jobs frequently enough, should be able to describe the content and behaviours associated with the job (Borman, 1978; Latham et al, 1979). Thus, as the primary property developers in Ghana, the GREDA members should have a detailed knowledge and understanding of the sectors domain and procedures and should (based on their experience) be able to provide realistic evaluations of the jobs and behaviours relevant to PMs' performance domain in MHBPs. This converges with the contention of Borman (1978) who argued that when people who are suitably experienced in what they do, when asked to undertake performance evaluations should be in a better position to provide relatively accurate responses.

5.3.2 The Sampling Frame

The sampling frame was extracted from the registered list of members kept by the secretariat of the GREDA. The list categorises the membership into the 10 administrative regions in Ghana and sums up to a total of 402 members across the country (see also chapter three). The full address and in a majority of cases telephone and mobile numbers of members were provided.

In chapter three (sub-section 3.5.2), it was noted that the structure of the Ghanaian construction industry is significantly skewed

towards the capital city as a result of the concentration of business activities there. The composition of the GREDA members reflects this trend with over 95% of them officially registered and based in the *Greater Accra-region*) (see for instance Figure 3.2). *Kumasi*, the second largest city accounts for only 2.4% of the membership. The remaining eight regions account for 2.6%. Given the relatively insignificant size of the membership in the other regions, the survey was limited to the *Greater Accra region*. It was intended to contact the participants by phone where necessary in the course of the survey. Consequently in establishing the sampling frame, a decision was also taken to exclude a few members whose telephone details were not available on the registered list. To this effect the sampling frame was eventually fixed at 372.

5.3.3 Towards Establishing an Appropriate Sample Size

The random seed number in SPSS was used to draw a random sample out of the sampling frame established. However before this was undertaken, it was important to establish the appropriate sample size needed to be drawn. According to Maisel and Perssel (1996) the appropriate sample size (n) can be established using the equation:

$$n = (Z \times \text{Standard deviation/confidence interval})^2 \dots\dots\dots (5.1)$$

Where Z is a constant, which relates to the confidence level

Thus, using the above formula, the appropriate sample size could be determined by setting the confidence level and interval, obtaining the Z- value and estimating the population standard deviation. The difficulty here is how to establish the standard deviation especially when the data has yet to be collected. According to Maisel and Persell (1996), this can normally be estimated from experience based on the proportion (PROP) currently employed in the population. The PROP is defined as the number of cases in any given category divided by the total number of cases (Maisel and Persell, 1996). Where there is no experience to draw on, one can consider a worse case scenario of a PROP of 0.5 (or estimate half way between). Setting the PROP at 0.5 will give the largest standard error, which in turn will force the researcher to select the largest possible sample size (see Maisel and Persell, 1996). Furthermore, this will ensure sufficient precision albeit it may also generate a sample size larger than is necessary (ibid). Subsequently, the population standard deviation was established thus:

$$\text{ST. DEV.} = \text{square root (PROP x NONPROP)} \dots\dots\dots (5.2)$$

Where NONPROP = 1-PROP

$$\text{Thus, ST. DEV.} = \text{square root (0.5 x 0.5)} = .50$$

Hence, using the worse case scenario of 0.5 for the PROP, a confidence limit of 95% and a confidence interval¹⁰ of plus or minus 0.1, the appropriate sample size was obtained from equation (i) thus:

$$n = (1.96 \times 0.50/0.1)^2$$

$$\text{i.e. } n = 96. \dots\dots\dots (5.3)$$

This means that, if a sample size of approximately 96 is obtained constituting the completed questionnaires, the data would be large enough for the sampling distribution of the proportion to have a normal distribution. However, given that it is highly uncommon to achieve a survey response of 100%, an appropriate sample size would have to be adopted that would help achieve the target of 96 as far as possible.

Subsequently, drawing on typical response rates to surveys undertaken in Ghana (see for instance Antwi; 2000; Ayirebi-Dansoh, 2005; Hammond, 2006), a 50% response rate was assumed. It was therefore decided to target up to 200 participants for the survey. Consequently, the random seed number in SPSS was used to select the 200 participants out of the sampling frame identified.

¹⁰ 10% was chosen based on what the researcher thinks is realistically achievable practically and also with the resources available

5.3.4 Commentary on the Fieldwork in Ghana

The fieldwork commenced in Ghana in the earlier part of June 2006. Bailey (1987) advises that in a study of this nature, the method used for the main survey should not be significantly different from the method used in the pilot survey otherwise the logic of the research method might be defeated. Given that the method used for the pilot survey proved reliable and successful, the same method was employed for the main survey. Subsequently, the survey instruments were (as in the pilot survey) sent by email to a representative at KNUST for distribution to the intended recipients. However, prior notification was sent to all participants regarding the intended purpose of the research and how the survey instruments were to be delivered and retrieved in Ghana (Appendix 5). This information was sent by post in the latter part of April 2006. The main objective was to pre-empt the potential respondents so that they would mentally and psychologically be prepared to participate in the survey. Indications are that such methods can help improve response rates in surveys (Bailey, 1987).

Four weeks after sending the prior notification, the survey instruments were despatched by email as attachments. A total of 200 fully addressed instruments each with a covering letter were despatched (see Appendix 4). As in the pilot survey, the instruction to the representative at the KNUST was that the survey

instruments were to be delivered and retrieved in person. This decision to distribute and retrieve the questionnaires in person was taken for two reasons; first, to make sure that the survey instruments got to the intended recipients; secondly, to help improve the response rate. Indeed, Ayirebi-Dansoh, (2005) recently used the same method in Ghana and it proved relatively successful yielding a response rate of approximately 60%. Accordingly, (and with consultation with the representative) two graduates from KNUST were contracted to undertake delivery and retrieval of the research instruments.

Out of the 200 research instruments intended for the survey, only 153 were successfully distributed as a result of poor signposting (poor directions to some of addresses provided). Above all, it turned out that some of the potential respondents albeit on the GREDA list used in drawing the sampling frame had ceased operations and/or could therefore not be traced. While the fieldwork was ongoing, a random phone call was made (from the UK) to some of the respondents to establish progress. Indications were that the fieldwork was being undertaken per the instructions. A period of up to four weeks was allowed for the fieldwork and all completed survey instruments were to be retrieved latest by early July 2006. After several efforts to help improve the response rate, especially, especially when the four week period projected had expired, survey instruments not retrieved by mid July 2006 were declared non-responsive. Thus, within a six-week period, all survey

instruments retrieved were put together by the representative and subsequently despatched back (by registered mail) to the UK (taking three weeks for delivery).

Out of the 153 instruments successfully delivered, 69 completed questionnaires were successfully retrieved representing a 45% response rate. Of the 69 completed research instruments, 12 were retained for validation purposes. Hence, out of the 69 completed survey instruments retrieved, 57 were actually used in developing the substantive model, described in chapter six.

While it was initially established that the appropriate sample size would have to be 96 at 10% confidence interval it is noted that a sample size of 69 was actually achieved in practice. This is usual in surveys and is therefore understandable. Nevertheless the 69 responses received represented 45% response rate which compare reasonably well with that achieved by, for instance, Ayirebi-Dansoh (2005) in the same condition in recent times. Furthermore, the response rate achieved was good enough for one to draw reasonably firm conclusions which are statistically valid. Besides, the sample size realised did not significantly affect the margin of error and this is reported in chapter nine (section 9.7) under limitations of the findings.

5.3.5 Data Entry and Editing

Having taken delivery of the data, a quick visual scan was undertaken to determine the extent to which the respondents had followed the instructions. The first impression was that the respondents had responded reasonably well to the questionnaire. Thereafter, data entry began by inputting into SPSS for subsequent analysis. While inputting the data it was observed that a few sections of the survey instruments were not fully completed. Chatfield (1995) explains that such minor omissions are normal in data collection and that this can safely be sorted out by undertaking data editing. Indeed SPSS can be programmed to automatically deal with all missing observations or alternatively a histogram of the variables involved can be plotted and the mean values used as a replacement (ibid). Thus, data editing is useful for checking for the existence of errors, missing observations and anything that is not consistent with the rest of the data (Chatfield, 1995).

Because of the relatively manageable size of data involved, a manual approach was adopted here by plotting histograms. Thus a print out of the raw data was carefully scrutinised visually to establish whether there has been any errors whilst doing the entries. This visual inspection revealed no inconsistencies. Hence the main problem that had to be dealt with was the missing data.

Consequently, SPSS was used to prepare a histogram of the variables involved and the average values of the scores calculated. Examples of these histograms are shown in Appendices 6 - 12. Taking Appendix 6 for instance, there was one missing data with regard to the variable “overall risk containment” since the respondent failed to provide a rating. As shown in appendix 6, the histogram produced an average score of 4.00, which was used as a replacement value. Other missing values were treated in the same way allowing the data to be made ready for detailed analysis

5.3.6 Questionnaire for evaluating aspects of output of results

To help validate the potential relevance of the recommended application of the model, which is fully described in chapter eight, page 225/226, a “one- page” questionnaire was sent to the representative identified at the KNUST to be targeted at five property developers and five PMs on life MHBPs project currently ongoing in Kumasi, Ghana. Full details of the project in question are described in chapter eight. The questionnaire (Appendix 16) was made simple (into a one page document) to help encourage the potential respondents to show keen interest and also act promptly in the midst of the workload they were dealing then dealing with. While targeting the property developers and their PMs, five construction management academicians of the KNUST,

(especially those with relevant consulting experience on the implementation of MHBPs) were also contacted to comment.

The “one-page” questionnaires were sent by email on the 31st May 2007 and distributed by the contact person on 1st June 2007. Given the simplicity of the questionnaire (and also the fact that all the respondents particularly the property developers and the PMs were operating on the same project site), the contact person was able to retrieve all completed questionnaires within four days of distributing them. Subsequently, these were faxed back to the UK on 6th June 2007. Unlike, the pilot and main surveys where the researcher identified the respondents (from a registered list) while the representative was instructed to deliver them at the various addresses, in this case, the representative was given the option to identify the respondents since they were working on a “life” project ((i.e using convenience sampling techniques). However, in order to confirm the validity of the process adopted, the representative was asked to document the names and telephone numbers of the persons contacted. Personal calls made by the researcher to thank those contacted provided reasonable indication that the relevant persons were approached.

5. 4 SUMMARY

This chapter has introduced some important issues relating to the research methodology adopted for the study in particular the

epistemological and philosophical applications. A clear distinction has been made between research methodology and research methods. Drawing on the epistemological, ontological and axiological assumptions, positivism was chosen as the appropriate paradigm. A review of the research methods revealed that survey was the most appropriate approach for eliciting the relevant data. Subsequently the design of the survey instrument was described following which a commentary was also provided on piloting of the questionnaires.

The survey characteristics including the sampling frame, the sample size and techniques for eliciting the relevant data have also been explained. The data was elicited from managing directors of the Ghana Real Estate Developers Association (GREDA) herein called property developers. Editing of the data and inputting into SPSS has also been described. The next chapter now addresses the preliminary analysis of the data which involves descriptive analysis, one-sample t-test and factor analysis.

CHAPTER SIX

CHAPTER SIX: PRELIMINARY ANALYSIS OF DATA ELICITED FROM MEMBERS OF THE GHANA REAL ESTATE DEVELOPERS ASSOCIATION

6.0 INTRODUCTION

Having concluded the introductory, reviewed the relevant literature and described the research methodology, this chapter now introduces the first part of the data analysis. A preliminary analysis is undertaken as a prelude to the substantive analysis which led to the development of the predictive model. This distinction was considered important so as to develop a better understanding of the data and also to reduce it to a manageable size. In this respect, the analyses presented here are based on data from the demographic including the respondents' perception of PMs' performance levels in Ghana and dependent variables.

The demographic data is analysed using descriptive statistics (specifically percentages) while the dependent variables is analysed using one-sample t-test and subsequently factor analysis. Factor analysis is implemented to reduce the dependent variables to a manageable size towards the subsequent development of the model.

6.1 ANALYSIS OF THE DEMOGRAPHIC DATA

Tables 6.1 to 6.5 present the results of the descriptive analyses. The aim (as noted previously) was to help provide an understanding of the profile of the respondents. Knowing the background of the respondents should help generate confidence in the credibility of data collected. Table 6.1 summarises how long the respondents had been members of the GREDA. Whereas 12% indicated that they have been members for up to a maximum of five years, the majority constituting 88% (i.e. 35+32+21) indicated they had been members for over five years. Further examination of the Table indicated that, of these 88%, more than half have been members of the GREDA for over 10 years (see Table 6.1). The indication is that a majority of the respondents are relatively experienced as GREDA members. A plausible conclusion therefore is that the respondents are well vested in the activities of GREDA including the implementation of MHBPs. Indeed, Table 6.2, which sought to establish the experience of the respondents in the implementation of MHBPs lends support to this interpretation. That is, over 90% of the respondents indicated that they have more than five years experience in the implementation of MHBPs, with about 56% (i.e. 32+12+12) having over 10 years experience (Table 6.2).

Table 6.1: Experience of Respondents as Greda members

No. of years	Up to 5 years	6-10 years	11-15 years	16-20 years	Over 20 years	Total
%	12	35	32	21	0	100
Response Number	7	20	18	12	Nil	57

Table 6.2: Experience of Respondents in the Implementation of MHBPs

No. of years	Up to 5 years	6-10years	11-15 years	16-20 years	Over 20 years	Total
%	7	37	32	12	12	100
response Number	4	21	18	7	7	57

Respondents were asked to indicate the annual turnover of their organisation in the last five years (refer Table 6.3). Whereas 37% indicated an annual turnover of £600,000, 21% indicated an annual turnover of around £700,000 - 1.2million, and 42% indicated an annual turnover of over £1.2 million. By Ghanaian standards an annual turnover of £ 600,000 suggests a conservative delivery rate of approximately 10 modern¹¹ three-bedroom house-units per year. The indication is that most of the respondents are indeed active in the business of implementing MHBPs. Respondents were asked to indicate the average quantity of house-units built per year (refer to Table 6.4). 85% indicated that they build an average of up to 20- 40 house-units per year, 10% indicated that they build between 40 and 60 house-units per year and the remaining 5% stated that they deliver over 100 house-units. These results reflected the findings on annual turnover presented in Table 6.3 which suggests that a majority of the firms averagely undertake 40 house-units per year.

¹¹ Modern means house-units containing all facilities deemed adequate for decent housing

Table 6.3: Overall turnover of the respondents in the last 5 years

Amount	Up to £600	£700-1.2M	Over £1.2 M	Total
% response	37	21	42	100
Number	21	12	24	57

Table 6.4: Average quantity of house-units built by respondents

Quantity	Up to 20 house-units	21-40 house-units	41-60 house-units	61-80 house-units	81-100 house-units	Over 100 house-units	Total
% response	46	39	10	-	-	5	100
Number	26	21	6	-	-	3	57

Respondents were asked to provide details of the type of MHBPs on which they are mostly commonly engaged. The results indicate that while 8% have dealt with multi-storey blocks, none of the respondents had been engaged on terraces and maisonettes. Alternatively, 92% (i.e. representing 22+70) indicated that they have experience of building semi-detached and detached house-units with the proportion leaning towards the latter. This is consistent with the type of housing works most property developers are engaged in which are predominantly targeted at the upper end of the market (refer Anokye, 2003).

Table 6.5: Typical MHBPs built by respondents

Type	Multi-storey	Terrace	Semi-detached	Detached	Maisonette
% response	8	0	22	70	0
Number	5	0	12	40	0

Generally the results indicate that the respondents have reasonable experience in the implementation of MHBPs. Furthermore, the findings suggest that most respondents are regularly active and have executed MHBPs in the last five years. It seems therefore plausible to conclude that those who responded to the survey are sufficiently experienced in the construction of MHBPs to provide data which is credible.

6.2 STANDARDIZED OPINION OF RESPONDENTS ON THE PERFORMANCE LEVEL OF PMs in MHBPs in GHANA

As part of the data collection it was deemed necessary to establish from the property developers what their perception of PMs' performance in MHBPs in Ghana was. It was considered that knowledge of this kind would provide some basis to have an insight into how the respondents view the performance of PMs in the current construction climate in Ghana. Subsequently the respondents were asked to rate the level of performance of PMs from very low to very high, where very low represents a percentage of 10-29%, low = 30-49%, average = 50-59%, High = 70-79% and very high over 90%. Table 6.6 presents a summary of the results. The perception of the respondents suggests that over 70% consider the levels of performance achieved by PMs to be satisfactory. This could be interpreted to mean that the respondents are not particularly satisfied with the performance of PMs and

probably feel that it could be better. That is, given the perception of the respondents, there is some recognition of the potential for improvement.

Table 6.6: Perception of respondents on the performance level of PMs in MHBPs

Performance level	Percentage performance level	Response of property developers	Percentage response
Very high	Over 90	0	0
High	70-90	13	22
Average	50-69	41	71
Low	30-49	3	5
Very low	10-29	0	0
Total		57	100

While it was not the intention to generalise the results presented, this standardized opinion provides a fair idea of what could be the perceived levels of performance level of PMs in MHBPs in Ghana. In order to to undertake the modelling exercise, there was the need to have an adequate understanding of what the property developers generally perceive as success on MHBPs. This was established by analysing the 15 potential criteria that constituted the dependent variables.

6.3 ANALYSIS OF DEPENDENT VARIABLES

Two statistical analyses were undertaken, namely one sample t-test and factor analysis. The one-sample t-test was used to establish the relative importance of the variables whilst factor analysis was used in establishing which of the variables could be

measuring the same underlying effect and also reduce the dependent variables to a manageable size. The procedure, findings and relevant discussion follows.

6.3.1 One Sample T-test for Ranking Dependent Variables

The one sample t-test is used to establish whether a sample mean is significantly deviant from a hypothesised mean. The hypothesis for a single sample –test is typically set thus:

$$H_0: U = U_0$$

$$H_a: U <, > U_0$$

Where, H_0 denotes the null hypothesis, H_a denotes the alternative hypothesis and U_0 denotes the hypothesized or population mean. In a typical one-sample-test, the mean of the test group, degree of freedom for the test (which approximates the sample size), the t-value (which is an indication of the strength of the test) and the p-value (which is the probability value that the test is significant) are commonly reported (see for instance, Reymont and Joreskog, 1993; Hair et al, 1998; Field, 2005). According to Hair et al (1998) when the sample size is more than 30, the central limit theorem shows that a normal distribution can be assumed. Field (2005) also argues that with a sample size of more than 50, the sampling distribution will almost always approach normal distribution albeit

considering the size of the sampling frame or population. Subsequently, with a sample size of 57 (out of a population of 372) the assumptions of the central limit theorem were invoked to support the view that the sample size is relatively adequate to draw statistical inferences. Furthermore, while the Likert scaling adopted is ordinal, here it is assumed to be interval scaling given the equal spacing of the scale (see for instance Blaikie, 2003).

Subsequently, a statistical t-test of the mean was carried out to determine whether the population considered a specific attribute to be important or otherwise. The mean ranking of each attribute was also tabulated to help provide a clearer picture of the consensus reached by the respondents. A summary of the test results are shown in Tables 6.7 to 6.9.

The mean for each attribute including the associated standard deviation and standard error are presented in Table 6.7. For each attribute, the null hypothesis was that the attribute was unimportant ($H_0: U = U_0$) and the alternative hypothesis was that the attribute was important ($H_a: U > U_0$), where U_0 as already explained is the population mean. Thus U_0 represent the critical rating above which the attribute is considered important. Given that the rating scale adopted ascribed higher ratings of 4 and 5 to important and very important attributes, U_0 was fixed at an appropriate level of 3.5 (see for instance Ling, 2002). The significance level was also set at 95% in accordance with

conventional risk levels (see for instance Colen, 1992 cited in Ling, 2002). That is, based on the five-point Likert rating scale, a success criterion was deemed critical or important if it had a mean of 3.5 or more. Where two or more criteria have the same mean, the one with the lowest standard deviation was assigned the highest importance ranking (see for instance Shen and Liu, 2003; Field, 2005).

The standard error is the standard deviation of sample means and is a measure of how representative a sample is likely to be to the population. A large standard error (relative to the sample mean) suggests that there is a lot of variability between means of different samples. A small standard error suggests that most sample means are similar to the population mean and so the sample is likely to be an accurate reflection of the population (Field, 2000; 2005). The standard error associated with all the means is relatively close to zero suggesting that the sample chosen is an accurate reflection of the population (Table 6.7).

Table 6.7: Results of t-test showing one-sample statistics

	N	Mean	Std. Deviation	Std. Error Mean
Technology transfer	57	3.5719	1.015	.134
Health and safety on individual house-units	57	4.035	.981	.130
Overall health and safety measures	57	4.035	.925	.123
Environmental impact of individual house-units	57	3.849	.953	.126
Overall environmental impact	57	4.011	.956	.127

	N	Mean	Std. Deviation	Std. Error Mean
Risk containment on individual house-units	57	3.639	.894	.118
Overall risk containment	57	3.767	.886	.117
Customer satisfaction on individual house-units	57	4.393	.793	.105
Overall customer satisfaction	57	4.393	.772	.102
Quality of individual house-units	57	4.500	.681	.090
Overall project quality	57	4.607	.557	.074
Rate of delivery of individual house units	57	4.072	.821	.108
Overall project duration	57	4.179	.804	.106
Cost of individual house units	57	4.572	.623	.082
Overall project costs	57	4.754	.689	.091

Note: these variables are already defined in chapter four, Table 4.1

The fact that the standard deviations are all less than 1.0 indicates that there is little variability in the data. Alternatively, standard deviation values of less than 1.0 indicated consistency in agreement among the respondents of the reported level of results (see for instance, Steven, 1996; Field, 2005).

However it is important to draw attention to the variable *technology transfer*, which had a standard deviation slightly more than one (1.02) suggesting that there might be differences to how this variable was interpreted by the respondents. Further discussion on the t-test below provides plausible explanation for this.

The significance (i.e. p-value) of each attribute is displayed in Table 6.8. The p-value is for a two-tailed test, however as shown per the test hypothesis, what is of interest here is one-tailed test (i.e. $U > U_0$). Subsequently, the “sig.” value in Table 6.8 has been divided by two and the summary listed in Table 6.9.

Table 6.8: Results of One-Sample Test showing test signifance

	Test Value = 3.5					
	T	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
Technology transfer	.535	56	.595	.072	-.197	.341
Health and safety on individual house-units	4.117	56	.000	.535	.275	.796
Overall health and safety measures	4.367	56	.000	.535	.289	.781
Environmental impact of individual house-units	2.765	56	.008	.349	.096	.602
Overall environmental impact	4.033	56	.000	.511	.257	.764
Risk containment on individual house-units	1.171	56	.247	.139	-.099	.376
Overall risk containment	2.273	56	.027	.267	.032	.502
Customer satisfaction on individual house-units	8.485	56	.000	.893	.682	1.103
Overall customer satisfaction	8.735	56	.000	.893	.688	1.097
Quality of individual house-units	11.080	56	.000	1.000	.819	1.181
Overall project quality	15.012	56	.000	1.107	.959	1.255
Rate of delivery of individual house units	5.262	56	.000	.572	.354	.789
Overall project duration	6.374	56	.000	.679	.466	.892
Cost of individual house units	12.996	56	.000	1.071	.907	1.237
Overall project costs	13.751	56	.000	1.254	1.072	1.437

Table 6.9: Summary of t-test showing rankings and results of 1-tailed test.

	Mean	Standard deviation	Ranking	Sig. (1-tailed)
Overall project costs (CSF1)	4.754	.689	1	.00025
Overall project quality (CSF2)	4.607	.557	2	.00025
Cost of individual house units (CSF 3)	4.572	.623	3	.00025
Quality of individual house-units (CSF 4)	4.500	.681	4	.00025
Overall customer satisfaction (CSF 5)	4.393	.772	5	.00025
Customer satisfaction on individual house-units (CSF 6)	4.393	.795	6	.00025
Overall project duration (CSF 7)	4.179	.804	7	.00025
Rate of delivery of individual house units (CSF 8)	4.072	.821	8	.00025
Overall health and safety measures (CSF 9)	4.035	.925	9	.00025
Health and safety on individual house-units (CSF 10)	4.035	.981	10	.00025
Overall environmental impact (CSF 11)	4.011	.956	11	.00025
Environmental impact of individual house-units (CSF 12)	3.849	.953	12	.004
Overall risk containment (13)	3.767	.886	13	.014
Risk containment on individual house-units (CSF 14)	3.639	.894	14	.124
Technology	3.572	1.015	15	.298

	Mean	Standard deviation	Ranking	Sig. (1- tailed)
transfer (CSF 15)				

The summary shown in Table 6.9 indicates that *overall project cost* emerged as the highest ranked critical criteria whilst *technology transfer* emerged as the lowest. Generally the findings largely concur with the conventional wisdom of perceiving project success in terms of *cost*, *time* and *quality*.

However, it is interesting to note that, whilst *overall project quality* was ranked 2nd behind *overall project cost*, the criterion, *overall project duration* was ranked 7th. A plausible explanation for this somewhat surprising result is that, in Ghana and for that matter many other developing countries, whilst the demand for increased housing supply exists, completed house-units take some time to be sold due to the relatively low income of most new homebuyers. Subsequently, property developers are not particularly keen on delivering projects on time unless there are willing buyers (i.e. if prospective buyers can readily be identified). Otherwise, it appears the practice is for the property developers to build at their own pace hoping that a willing buyer would show

interest sooner than later. However, as soon as a buyer shows keen interest, then the necessary steps would be taken to speed up delivery to meet the buyers' specific circumstances. Indeed, *rate of delivery of individual house-units* was also ranked 8th behind *overall project duration* suggesting that though time is an important criteria, it is not an issue that property developers in many developing countries such as Ghana are particularly concerned about.

Table 6.9 reveals that, apart from the so-called traditional criteria, some of the recently acknowledged new and emerging criteria are now also perceived by property developers in defining critical success criteria for MHBPs in the Ghanaian environment. That is, success criteria can also be defined in terms of elements such as *health and safety* ($p = 0.00025$), *overall environmental impact* ($p = 0.00025$), *overall risk containment* ($p = 0.014$) and *overall client satisfaction* (Table 4, $p = 0.00025$ in all cases). Note however that while *technology transfer* is generally believed to have the potential for improving overall performance outcome (Mehta and Bridelll, 2005; Yang et al, 2006), in the Ghanaian context property developers do not consider it as a critical success criteria ($p = .278$). This provides informative evidence that property developers in the Ghanaian house building industry might need to reconsider their current perception about technology transfer as not a critical success criteria.

Another point worth noting is that whilst *overall risk containment* emerged significant with a ranking of 14th, *risk containment on individual house-units* emerged non-significant ($p=.124$). In many developing countries such as Ghana, one of the major risk factors associated with MHBPs relates to access to credit. Furthermore where credit is available it is at a huge interest rate of sometimes up to 32% per annum (see Bank of Ghana, 2004). Moreover, the business cycle in the country including inflation is constantly changing (see Ayirebi-Dansoh, 2005). Thus property developers might therefore be concerned about “creative” ways to contain the associated risk that comes with gaining credit rather than spending too much time on risk associated with specific issues relating to individual house-units. Thus, the PMs’ knowledge in appropriate risk management (especially with respect to cash-flow forecasting) and in particular how they can be creative in assessing, transferring and containing the associated risk embedded can help in appropriate allocation of resources in this respect.

It is understandable that the criteria *cost*, *time* and *quality* are perceived as very critical by property developers as these traditional measures constitute the foundation of project success criteria in project management practice. However, in many developing countries the concept of viewing *customer satisfaction*, *environmental friendliness*, *health and safety* and *risk containment* as potential success criteria has for a considerable length of time

been taken for granted (see for instance Smallwood, 2000). This is because of the relatively weak technological, socio-economic and structural conditions prevailing, which do not readily provide the enabling environment for these criteria (particularly, those related to *environmental* and *health and safety*) to be well appreciated. It is therefore encouraging to note that despite the lack of adequate structures (such as logistics) to enforce and/or facilitate the appreciation of some of these criteria (e.g. *environmental and health and safety*) the climate appears to be changing with respect to the perception of property developers.

Traditionally, the housing industry in many developing countries was Government controlled in the sense that, Government was responsible for the direct supply of houses. However, in line the with current paradigm shift, private property developers have now emerged as partners and their input is increasingly being recognised (see for instance Keivani and Werna, 2001). This has created the needed competitive environment and for the property developers to source for the appropriate market for their products. There is therefore the need for property developers to plan appropriately towards meeting the potential challenges ahead and it is therefore also not surprising that *customer satisfaction* is now receiving prominence.

6.3.2 Factor Analysis of Dependent Variables

Due to the relatively large number of the dependent variables (i.e. success criteria) involved in the study, it was deemed necessary to use factor analysis to establish which of the variables could be measuring aspects of the same underlying dimensions. Factor analysis is useful for finding clusters of related variables and thus ideal for reducing a large number of variables into a more easily understood framework (see also, Hair et al, 1998; Norussis, 2000). Tables 6.11 to 6.16 and Figure 6.1 provides the details of the results. However, before addressing these, it is important to discuss some pertinent issues relating to the appropriate sample size for undertaking and establishing the reliability of factors analysis.

The question of whether the reliability of factor analysis is dependent on sample size has been debated in the literature resulting in many rules of thumb (see for instance Field, 2000; 2005). Indeed, there have been times when it was thought that the appropriate sample size was the most important factor in determining the reliability of factor analysis (Field, 2005). However, with the introduction of simulation and Monte Carlo test (see for instance Guadagnoli and Velicer (1988) cited in Field, 2005; Hair et al,1998), empirical results have shown that the most important factor in determining the reliable factor solution was not only the absolute sample size but instead the absolute magnitude of the factor loadings. In effect, Guadagnoli and Velicer (1988) asserted that in undertaking factor analysis, if a factor has

four or more loadings greater than 0.6, then it is reliable regardless of the sample size. While the sample size of 57 used here could be argued by some researchers as barely acceptable for factor analysis, the factor loadings and other subsequent texts (described later) confirmed the reliability of the analysis (Tables 6.12 and 6.13). Furthermore, the factors obtained seems reasonably realistic and supported by the mainstream literature in project success criteria, especially in the context of the study (see for instance Odusami, 2003; Mbachu and Nkado, 2007).

While undertaking the factor analysis, it was important to validate the reliability of the research instrument (Field, 2000; 2005). Reliability of the research instrument means that a scale should consistently reflect the construct it is measuring. Thus, the reliability test can be used to measure the consistency of the five-point scale and hence help establish the consistency of the research instrument for factor analysis. Subsequently, the 15 dependent variables (Table 6.10) were subjected to the Cronbach's reliability test, which is mostly used in this circumstance (see for instance Field, 2005).

The test results as shown in Table 6.11 indicate that Cronbach's alpha achieved an overall high of 0.8966 suggesting overall reliability of the research instrument for factor analysis. Thereafter, the data was subjected to factor analysis but in particular, principal component analysis, with varimax rotation.

Principal component analysis was chosen because unlike “factor analysis” this lends itself to psychometrically sound procedures in terms of linearity and simplicity. Further it has the potential for establishing discriminate function variates (see for instance Brace et al, 2003; Field, 2000; Field, 2005).

Table 6.10: Nominated Success criteria for mass house building projects

Dependent variables
Overall project cost (OVPROJCS) (CSF1)
Cost of individual house-units (COSTINHS) (CSF2)
Overall project duration (OVPRODTN) (CSF 3)
Rate of delivery of individual house-units (RDELINHS) (CSF 4)
Overall project quality (OVPROJQU) (CSF 5)
Quality of individual house-units. (QUAINHSE) (CSF 6)
Overall Customer satisfaction (OVCUSASA) (CSF 7)
Customer satisfaction on individual house-units (CUSTAIN) (CSF 8)
Overall Risk containment (OVRISCON) (CSF 9)
Risk containment on individual house-units. (RICONIND) (CSF 10)
Overall Environmental impact (OVENVIMP) (CSF 11)
Environmental impact of individual house-units. (ENIMPIND) (CSF 12)
Overall health and safety measures. (OVHTSFY) (CSF 13)
Health and safety measures on individual house-units (HELSIAN) (CSF 14)

Table 6.11: Cronbach's Reliability Analysis - S C A L E (A L P H A)

Item-total Statistics				
	Scale Mean if Item Deleted	Corrected Variance if Item Deleted	Item- Total Correlation	Alpha if Item Deleted
TECTRANS	58.8053	56.3205	.4338	.8970
HELSAIN	58.3421	51.7114	.7997	.8796
OVHTSFY	58.3421	52.4543	.7948	.8802
ENIMPIND	58.5281	53.3253	.6985	.8845
OVENVIMP	58.3667	54.1687	.6311	.8875
RICONIND	58.7386	53.9888	.6984	.8846
OVRISCON	58.6105	53.6356	.7353	.8831
CUSTAIN	57.9842	57.3610	.4959	.8928
OVCUSHSA	57.9842	55.8610	.6504	.8872
QUAINHSE	57.8772	58.4929	.4801	.8933
OVPROJQU	57.7702	59.1768	.5223	.8926
RDELINHS	58.3053	56.2969	.5676	.8901
OVPRODTN	58.1982	57.2634	.4971	.8928
COSTINHS	57.8053	60.5648	.3104	.8982
OVPROJCS	57.6228	61.3071	.2021	.9019
Reliability Coefficients				
N of Cases =	57.0	N of Items = 15		
Alpha =	.8966			

Prior to principal component analysis, the communalities involved were first established (see Table 6.12). Communality explains the total amount an original variable shares with all other variables included in the analysis and is very useful in deciding which variables to finally extract in the varimax rotation and in determining the adequacy of the sample size (Field, 2000;2005). In this case, after extraction of all variables, average communality value was above 0.6 suggesting also that the sample size is adequate. Furthermore, the data was subjected to the Kaiser-

Meyer-Olkin (KMO) measure of sampling adequacy including the production of a correlation matrix (Tables 6.13 and 6.14).

Table 6.12 Communalities

	Initial	Extraction
Technology transfer	1.000	.578
Health and safety on individual house-units	1.000	.774
Overall health and safety measures	1.000	.812
Environmental impact of individual house-units	1.000	.876
Overall environmental impact	1.000	.872
Risk containment on individual house-units	1.000	.643
Overall risk containment	1.000	.726
Customer satisfaction on individual house-units	1.000	.773
Overall customer satisfaction	1.000	.662
Quality of individual house-units	1.000	.785
Overall project quality	1.000	.632
Rate of delivery of individual house units	1.000	.578
Overall project duration	1.000	.742
Cost of individual house units	1.000	.692
Overall project costs	1.000	.777

Extraction Method: Principal Component Analysis.

Table 6. 13: KMO and Bartlett's Test

Kaiser-Meyer-Olkin	.758
--------------------	------

Measure of Sampling Adequacy		
Bartlett's Approx.	531.149	
Test of Chi-Sphericity		
Sphericity		
Df	105	
Sig.	.000	

The KMO also achieved a sufficiently high value of 0.75 suggesting that the sample size is indeed adequate for factor analysis (see for instance, Field, 2000). Given the high KMO achieved in this case, there was no need to produce anti-image matrices to further check the adequacy of the sample size. However, the Bartlett test of sphericity was undertaken. This is used to establish the potential correlations suggesting that clusters do exist in the factors. In this case, a sphericity value of 531.149 was realised and the associated significance was 0.000 (Table 6.14 overleaf). This indicates that the population matrix is not an identity matrix. An identity matrix is one which all the elements of the diagonals are one and all off-diagonals are zero (Field, 2000). Thus, the correlation matrix shows that the success criteria identified share some common underlying relationships and that clusters do exist.

Table 6. 14: Correlation matrix of factor analysis

.Factor	C SF1	C SF2	C SF3	C SF4	C SF5	C SF6	C SF7	C SF8	C SF9	CSF1 0	CSF1 1	CSF1 2	CSF1 3	CSF1 4	CSF1 5
CSF1 0	1.00														
CSF2 0	.321	1.00													
CSF3 0	.292	.082	1.00												
CSF4 0	.095	.565	.518	1.00											
CSF5 0	.071	.401	.289	.475	1.00										
CSF6 0	-.029	.147	.137	.363	.651	1.00									
CSF7 0	.435	.375	.082	.117	.282	.162	1.00								
CSF8 0	.190	.235	.095	.209	.397	.304	.549	1.00							
CSF9 0	.126	.409	.200	.312	.481	.394	.320	.493	1.00						
CSF1 0	.119	.451	.335	.374	.500	.371	.517	.420	.766	1.000					
CSF1 1	-.039	.450	.188	.343	.475	.179	.313	.375	.706	.706	1.000				
CSF1 2	.100	.542	.184	.407	.434	.257	.320	.304	.755	.755	.858	1.000			
CSF1 3	.174	.216	.198	.315	.422	.511	.396	.522	.686	.624	.424	.495	1.000		
CSF1 4	.184	.189	.198	.299	.436	.448	.355	.412	.599	.685	.407	.536	.841	1.000	
CSF1 5	.010	.214	-.001	.129	.443	.474	.214	.453	.435	.356	.155	.173	.446	.381	1.000

Note: Kaiser Meyer-Olkin measure of sampling adequacy= .758; Bartlett test of sphericity= 531.149; Significance=0.000

Note: Acronyms as explained in Table 6.9

Having concluded all the necessary preliminary tests, the rotated component matrix of the principal component matrix was produced (see Table 6.15). The eigenvalue and factor loading were set at conventional high values of 1.0 and 0.5 respectively (see for instance Dainty et al, 2003: Chan et al, 2002). As shown in table 6.15, four components with an eigenvalue greater than 1.0 were extracted using the factor loading of 0.50 as the cut-off point. The scree plot (Figure 6.1) also confirmed the four components. The components can be thought of representing measuring scales for PMs' performance outcome in MHBPs.

Table 6.15: Rotated Component Matrix

	Component			
	1	2	3	4
Overall environmental impact	.909			
Environmental impact of individual house-units	.904			
Overall health and safety measures	.760			
Health and safety on individual house-units	.710			
Customer satisfaction on individual house-units		.815		
Technology transfer		.767		
Overall risk containment		.679		
Overall customer satisfaction		.619		
Risk containment on individual house-units		.613		
Rate of delivery of individual house units		.528		
Quality of individual house-units			.813	
Cost of individual house units			.772	

Overall project quality	.595
Overall project costs	.827
Overall project duration	.765

Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization.
a Rotation converged in 7 iteration

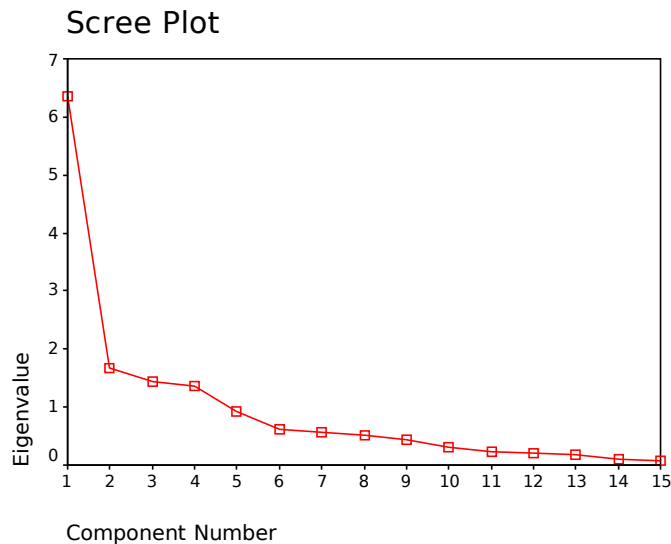


Figure 6.1: Scree plot for factor analysis

The total variance is presented in Table 6.16. The table indicates that the total variance explained by each component extracted is as follows; component 1 (42.401%), component 2 (11.233%), component 3 (9.530%), component 4 (9.115%). Thus, the final statistics of the principal component analysis and the components extracted accounted for 72.279% of the total cumulative variance of PMs' performance outcome in MHBPs. Based on an examination of the inherent relationships among the variables under each component, the following interpretation has been provided; component 1 is termed environmental-safety criteria;

Chapter 6 Preliminary Data analysis

component 2, customer satisfaction; component 3, quality;
component 4, overall cost-time criteria.

Table 6.16: Component Transformation Matrix

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	6.558	43.721	43.721	6.558	43.721	43.721	3.737	24.910	24.910
2	1.680	11.197	54.918	1.680	11.197	54.918	3.149	20.990	45.900
3	1.438	9.586	64.505	1.438	9.586	64.505	2.166	14.438	60.338
4	1.246	8.308	72.813	1.246	8.308	72.813	1.871	12.474	72.813
5	.921	6.138	78.951						
6	.624	4.157	83.108						
7	.581	3.872	86.980						
8	.458	3.056	90.036						
9	.447	2.981	93.017						
10	.308	2.051	95.067						
11	.221	1.477	96.544						
12	.190	1.267	97.811						
13	.174	1.159	98.971						
14	.086	.576	99.546						
15	.068	.454	100.000						

Extraction Method: Principal Component Analysis

6.4 DISCUSSION OF RESULTS

6.4.1 Component 1: Environmental-safety criteria

The four extracted success criteria for component 1 were *overall environmental impact* (90.9%), *environmental impact of individual house-units* (90.4%), *overall health and safety measures* (76.0%) and *health and safety on individual house-units* (71.0%). The number in parenthesis indicates the respective factor loadings. From Table 6.16, this cluster accounted for 43.7% of the variance. These criteria share a common link to *environmental issues*. As argued by Ukoma and Bemish (1997), the suitability of the living environment to the needs of the residents is now very important. A good environmental image is also important for improving the competitive edge of organizations in an increasingly complex and environmentally conscious industry (Ngowi, 2001). In Ghana for instance, environmental issues have in the recent past also received significant attention in the construction industry especially since the Environmental Protection Agency (EPA) was established in 1994. Subsequently the EPA is now empowered to regulate and enforce building regulation and planning laws (EPA, 1994) relating to MHBPs.

However, the reality is that, property developers tend to allow considerable amounts of wastage on site rather than engaging human resources to manage it (Poon et al, 2004). Thus waste

management is a major environmental issue including construction and demolition waste being deposited at landfill sites (ibid). Morrel et al (2001) also admits that as the demand for housing continues, widespread use of high energy materials such as aluminium, cement, concrete and steel must comply with directives on protection of the environment including the emission of carbon dioxide, obligation to rehabilitate quarries and protection of materials extracted from river beds. Thus the implication is for property developers and interested stakeholders to appropriately allocate resources to assist the PMs to handle these increasingly important issues. The irony is that, while the need to preserve the environment is increasingly becoming important, developing countries in particular are not well positioned to face these challenges (Ofori, 2000). Furthermore, project management education and training on environmental issues, which is still evolving leaves much to be desired (Smallwood, 2000). Thus developing countries in particular have a lot more to do in developing the capacity and expertise of the key managerial staff towards addressing environmental issues in MHBP.

It is not strange that health and safety relating to individual house-units has been shown to be related to the environmental criteria. This is because ultimately safety standards have environmental implications and vice versa (see for instance Kibert and Coble, 1995 cited in Xiao, 2003). The crux of the matter is that

environmental-safety protection is no longer a concept but has now become a worldwide challenge facing the construction industry (Pasquires cited in Xiao, 2003). It is therefore recommended that property developers and all stakeholders should join forces towards developing appropriate structures that would enable PMs' to be adequately prepared to face the challenges ahead in the future management of the environment in MHBP.

6.4.2 Component 2, Customer satisfaction

Component 2 accounted for 11.2% of the variance. The respective loading factors are *customer satisfaction with individual house-units* (81.5%), *technology transfer* (76.7%), *overall risk containment* (67.9%), *overall customer satisfaction* (61.9%), *risk containment on individual house-units* (61.3%) and *rate of delivery of individual house-units* (52.8%). Subsequently this component was labelled *customer satisfaction*. Satisfied customers as the evidence suggests are the backbone of the house building industry (Baker et al, 1983; Torbica and Stroh, 2001). It is therefore significant that *customer satisfaction with house-units* emerged as the most critical factor in this grouping. In particular Torbica and Stroh (2001) assert that for property developers to compete in the long term, they must be sure that current and prospective customers are satisfied.

Interestingly, Toole (1998) has noted that homebuyers approach the buying decision for a new home very differently from other purchases, often with very strong bonds to tradition. Furthermore home buyers respond to “word-of-mouth” effects more than mass media or other types of advertising placing the reputation of the property developer in the centre of all these. Subsequently the satisfaction of “old or current customers” is instrumental in convincing potential future homebuyers. In this respect Toole (1998) further found that it is the service provided by property developers throughout the lifecycle of MHBPs that is most important in shaping the overall homebuyer satisfaction. The remaining variables namely *overall risk containment*, *risk containment on individual house-units* and *technology transfer* either are directly or indirectly associated with the provision of some kind of service in the house-building agenda. It would therefore be necessary for these variables to be appropriately given the due attention in MHBPs towards satisfying the ultimate users who are the customers.

Here, *technology transfer* refers to the application of technology that is new to the property developer and significantly improves the design and construction of a living space by decreasing cost, increasing performance and improving the business of the process. While the “t-test” suggested that property developers do not consider the variable *technology transfer* significantly important for assessing project success the relatively high factor loading

(.767) it received in the cluster customer satisfaction in the factor analysis suggests that it could be an an important variable for understanding the underlying determinants of the success dimensions of MHBPs.

Uncertainty plays a critical role in the adoption of innovations by property developers (Toole, 1998). Uncertainty is defined as the state when the property developer is lacking information relating to decision-making (ibid). Subsequently, Toole (1998) identified five characteristics that may make it difficult for property developers to understand how innovations may affect their operations. That is: the end product varies considerably; there is a long time frame and wide range of conditions associated with the production process; the end product of the task consists of many interacting parts and/or dynamic subsystems; the task requires high levels of tacit knowledge and skills and the task requires interaction with a large number of diverse entities. Hence property developers have to be made to be convinced that a new technology will provide significant advantages over existing products before they will commit themselves.

What is also quite clear is that, the adoption of new technology involves taking some risk. Hence the more uncertainties that exists the more reluctant property developers would be to embrace technological innovations (Toole, 1998). Alternatively Yang et al (2006) have suggested that a plausible way forward for

minimising the uncertainties is to clearly quantify the benefits to be derived from technology adaptation and application. They suggested that it might be appropriate to quantify these benefits in terms of cost, schedule and safety success as these are issues of major concern to “project stakeholders.”

Given that *customers' satisfaction* is arguably the most critical factor here, there is also no doubt any uncertainty reduction would have to take their interest into serious consideration. Ultimately, whilst it is important for property developers to fully appreciate the potential risks associated with adopting technological innovation, their knowledge about the factors that are related to home buyers satisfaction or dissatisfaction would be an invaluable tool in achieving a competitive edge (see for instance Torbica and Stroh, 2001).

6.4.3 Component 3: Quality

Component 3 consists of *quality of individual house-units* (81.3%), *cost of individual house-units* (77.2%) and *overall project quality* (59.5%). By similar reasoning as before, this was labelled *quality of house-units* and accounted for 9.6% of the variance. *Quality of individual house-units* emerged the highest factor in this grouping and conforms to the empirical evidence that quality significantly predicts overall homebuyer satisfaction and ultimately project success (Torbica and Stroh, 2001). Indeed just like satisfaction,

the primary antecedents of quality are product and service performance and customer expectation concerning the future performance of the product (Anderson et al, 1994; Al-Monani, 2000).

In effect, a focus on improving quality at all stages of MHBPs is important to improving project success. The problem however is that no two identical houses are the same in quality because of variations in construction process and the weather, the skills and attitudes of the tradesmen and whether specified materials were correctly delivered and installed. In short, it is difficult for property developers to be completely confident that every portion of a new house that they build will stand up to the same design installation and occupancy conditions over the years (Ozoy et al 1996; Toole, 1998). The onus is therefore on property developers to make sure that the appropriate resources are channelled to enable the understanding of effective quality management that meets the bespoke needs of potential customers.

Granted that one of the main objectives of repetitive construction methods is cost effectiveness, it seems plausible that *quality of individual house-units* and *cost of individual house-units* are also seen to be measuring the same underlying criteria. The potential implication for PMs is that, whilst striving to make cost savings on the delivery of MHBPs, this should not be done at the expense of *quality on individual house-units*. This is against the background

evidence that often “profit” made by property developers is at the expense of quality (Rakwaro and Olima, 2003). Property developers are therefore reminded that while it is important to strive towards cost effectiveness in MHBPs this should be achieved by taking advantage of improved productivity of resources arising out of the repetitive works involved and not deliberately cutting down expenditure meant for quality improvement. Furthermore it is recommended that property developers should create the necessary environment so that their PMs can take advantage of the management tools available to help strike the right balance in achieving cost savings on individual house-units as well as expected quality standards.

6.4.4 Component 4: Cost-time criteria

Component 4 accounted for (8.3%) of the variance and comprised *overall project cost* (loading factor 82.7%) and *overall project duration* (loading factor 76.5%). Contrary to the earlier identification approach adopted, here both variables were combined to identify the cluster. This was done to emphasise the correlation between overall cost and overall time in MHBPs as demonstrated in the literature (see for instance Odenyika and

Yusif, 1997). Indeed the issue of shortening construction time, reducing cost and improving production performance have engaged both practitioners and researchers for some time, (see for instance Odenyika and Yusif, 1997; OKuwugo 1998; Chan and Kumaraswamy (1999); Tam and Zeng, 2002). These studies include motivation and productivity investigations as well as analysis of planning and scheduling techniques (Tam et al, 2002). Prefabrication and industrialisation have also been widely considered in housing projects towards improving overall time and cost associated with these projects. Other innovative methods such as modular boxes, pre-stressed panels and polystyrene techniques have also been advocated (Tam et al, 2002).

However, against the background of a huge demand for residential buildings in developing countries, delays and cost overruns are still major mitigating factors influencing the implementation of MHBPs (Chan and Kumaraswamy, 1999; Keivani and Werna, 2001). Indeed in some instances, the cost and time over-runs have been so severe that serious questions about the human resource management practices have been raised (Kaming et al, 1999). In the circumstances when an estimated one billion people are living in inadequate housing in developing countries, the cost-time relation is an issue that property developers have to seriously reconsider by devoting more attention towards achieving project success.

Generally these findings *among others* lend support to the prevailing evidence that the challenges facing property developers in recent times are how to minimise cost and time over-runs and to keep current and potential customers satisfied (Torbica and Stroh 2001, Tam et al, 2002). It is therefore recommended that property developers and PMs shell out particular attention and resources towards ensuring these factors are met in the delivery of MHBPs.

6.5 SUMMARY

This chapter has presented the preliminary analysis of the data. The analysis undertaken included descriptive statistics on the demographic data and one sample t-test and factor analysis on the dependent variables. The demographic results suggest that the respondents have reasonable experience in the implementation of MHBPs, which should give credence to the data collected. Exploratory analysis undertaken suggests that there is the potential for PMs to improve on their current performance as perceived by the respondents.

This chapter also reported on the results of one-sample t-test in respect of the dependent variables and the findings have been discussed. Thereafter factor analysis has been used to establish which of the potential success criteria could be measuring the

same underlying effect and also to reduce the variables to a manageable size for interpretation. The findings suggested that the success criteria in MHBPs in Ghana could be listed as environmental-safety, customer satisfaction, quality and cost-time. In the next chapter, the factors identified by the factor analysis would further be reduced to a single dependent variable. Thereafter the development of the model is described.

CHAPTER SEVEN

CHAPTER SEVEN: DEVELOPMENT OF A COMPETENCY-BASED PREDICTIVE MODEL

7.0 INTRODUCTION

Following the preliminary analysis presented in chapter six, this chapter now addresses the development of the substantive model. As already explained (see chapter four), for the purpose of this thesis, the substantive model is developed for the “construction phase” of the project lifecycle.

Drawing from the factor analysis, an index for assessing the PMs’ performance outcome is first developed. This was necessary to help provide a basis for converting the broad range of dependent variables (i.e the potential success criteria for MHBPs) into a single dependent variable (i.e to meet the requirements of multiple regression analysis). Subsequently, the components or clusters extracted from the factor analysis (see chapter six) are converted to a single dependent or composite variable herein called a measure of “PMs’ performance outcome”. Thereafter, the independent variables (comprising both *contextual* and *task performance behaviours*) are regressed against this *performance outcome* using “stepwise” regression analysis. The functions investigated under the regression analysis included the coefficient of determination (R^2), analysis of variance (ANOVA), multicollinearity test, Durbin-Watson test and residual analysis.

The findings suggest that the developed model is statistically valid and has the potential for subsequent development for use by practitioners.

To this effect, a discussion of the convergence of the findings against the background of the theoretical framework adopted is provided to help demonstrate the validity of the conclusions drawn. Subsequently, the chapter closes with an in-depth discussion of the significance of the individual variables identified (in the model) including issues relating to their potential application towards enhancing project management practice in MHBP

7.1 DEVELOPMENT OF PERFORMANCE OUTCOME INDEX

According to Blaikie (2003), an index is a set of items that measures a concept indirectly by assuming that what is being measured is related to that concept. To this effect, an index is useful for structuring multiple and yet distinctly related aspects of dimensions into a single score (Brown, 1976; Oppenheim, 1992; Hait et al, 1998).

Factor analysis is an important tool that lends itself to the construction of such “indexes” by combining a number of separate measures into a combined measure (Blaikie, 2003). Thus, the four components/clusters extracted in the factor analysis in the

previous chapter can be likened to representing four sub-indexes for the measurement of various aspects of the outcome of the PMs' performance in MHBPs (see for instance Blaikie, 2003). Having identified these sub-indexes, it is also possible to calculate the mean scores for each respondent for each index. This is done by computing a summation of each participant's response (i.e. in terms of the participant's score multiplied by the respective factor loadings) for the set of variables constituting the index and dividing by the number of variables involved (see Bailey, 1987; Blaikie, 2003).

Above all, in multivariate research, the various indexes identified can be combined to form an overall single index, which is particularly useful if dependent variables are involved (Meyers et al, 2005). In this case the various indexes are combined to form a "linear composite" function where each sub-index is weighted in a manner determined by the concept underlying the development of the index (see equation 7.1)

$$\text{Weighted composite} = w_1x_1 + w_2x_2 + w_3x_3 + \dots x_k w_k \dots \dots \dots$$

..... (7.1)

Here, each index in the composite is identified by the symbol x (with subscripts to differentiate them) while the symbols w_1 to w_k are the weights (i.e. proportions) assigned to each variable herein called "coefficients." (see Meyers et al, 2005).

Thus, the four components/clusters identified in chapter six (i.e. with regard to the factor analysis) can be deemed as representing four sub-indexes of the PMs performance outcome for MHBP in Ghana (equation 7. 2):

$$Y_i = w_1x_1 + w_2x_2 + w_3x_3 + w_4x_4 \dots\dots\dots$$

.... (7.2)

Where x_1 , x_2 , x_3 and x_4 represent the four sub-indexes (see also equation 7.3) and w_1 , w_2 , w_3 , w_4 represent appropriate coefficients as defined by their percentage proportions to the *performance outcome*.

Notwithstanding the unique contribution of each sub-index, in practice it is not expected that the four components constituting the sub-indexes would be satisfied at the expense of each other towards achieving the overall performance outcome (see Xiao, 2002; Barbie, 2006). Subsequently the four components constituting the sub-indexes were given equal weightings (i.e. coefficient) of 25% towards establishing a performance outcome index (equation 7.3):

$$Y_i = 0.25 \times [(\text{environmental impact index}) + (\text{customer satisfaction index}) + (\text{quality index}) + (\text{cost-time index})] \dots\dots\dots$$

..... (7.3)

Here environmental impact comprised *overall environmental impact, environmental impact on individual house-units, overall health and safety, health and safety on individual house-units*; customer satisfaction comprised *customer satisfaction on individual house-units, technology transfer, overall customer satisfaction, risk containment on individual house-units and rate of delivery of individual house-units*; Quality comprised *quality of individual house-units, cost of individual house-units, overall project quality*; and cost-time comprised *overall project cost and overall project duration*.

While this performance outcome index can be used to indirectly establish the average performance levels of PMs in MHBPs in Ghana, here the emphasis was to use it to indirectly establish the ensuing dependent variable for the development of the substantive predictive model.

7.2 THE DEPENDENT VARIABLE

Drawing on the performance outcome index, the dependent variable herein called *performance outcome* was computed (with the aid of SPSS) by establishing the mean score for each of the 57 participants who responded to the survey. Thus the score for dependent variable for each respondent was established using equation (7.4), whereby:

$$y_o = 0.25 [(0.909\text{ovenimp} + 0.904\text{enimpind} + 0.760\text{ovhsfty} + 0.730\text{helsian}) + (0.815\text{cusatin} + 0.767\text{tectrans}) + 0.679\text{ovriscon} + 0.619\text{ovcustsa} + 0.613\text{riconind} + 0.528\text{rdelinhs}) + (0.813\text{quainhse} + 0.772\text{cosinhs} + 0.595\text{ovprojqu}) + (0.827\text{ovprojcs}) + 0.765\text{ovprodtn}] \dots\dots\dots (7.4)$$

Note that the ratings provided by the participants for the dependent variables were used in establishing the mean scores, where ovenimp = *overall environmental impact*; enimping = *environmental impact of individual house –units*; ovhsfty = *overall health and safety*; helsian = *health and safety relating to individual house-units*; cusatin = *customer satisfaction with individual houe-units*; tectrans = *technology transfer*; ovriscon = *overall risk containment*; ovcusta = *overall customer satisfaction*; riconind = *risk containment relating to individual house-units*; quainhse = *quality of individual house-units*; costinhs = *cost of individual house-units*; ovprojqu = *overall project quality*; ovprojcs = *overall project cost*; ovprojdtn = *overall project duration*.

7.3 MULTIPLE REGRESSION ANALYSIS

The multiple regression technique was selected for developing the predictive model. Multiple regression was chosen in place of other possible analysis methods (e.g. logistics regression and discriminant analysis and artificial neural networks) because of

the characteristics of the variables under consideration and the aim of the modelling.

Multivariate discriminate analysis and logistics regression were not considered because the intention here was not to predict a categorical membership (i.e for instance whether the the PM is “good performer” or “bad performer”) but rather a score of the performance. While artificial neural networks (ANN) can capture and allow the uncovering of latent non-linear relationships amongst variables it is limited in its explanatory characteristics (Goh, 1999; Xiao, 2002), which was a most desired function of this research.

Multiple regression analysis is by far the most widely used multivariate technique to analyse the relationship (including the prediction) between several independent variables and a single dependent variable (Hair et al, 1998). Thus, multiple regression offers the opportunity to establish the evidence that one or more explanatory variables (independent variables, X_1, X_2, \dots, X_k) cause another dependent variable Y to change (Blaikie, 2003). In so doing, the analysis establishes the relative magnitude of the contribution of each predictor variable. Furthermore, it offers the opportunity to examine what proportion of the variance in the outcome variable is explained by each predictor variable and/or their combined effect (Brace et al, 2003). Using the classical

linear regression model, the relation between the predicted outcome y_p , and the predictor variables, x_1, x_2, \dots, x_k is defined as:

$$y_p = \alpha + \beta_1 x_1 + \beta_2 x_2 + \dots + \beta_K x_K + c \dots\dots\dots (7.5)$$

Where α = a constant on the y -axis; β_1 to β_K are coefficients so chosen as to minimise the sum of squared discrepancies between the predicted and obtained values of y_p ; c = error term of random variable with mean 0 and variance σ^2 and K = number of independent variables or parameters. In this case, the independent variables were represented by the operational measures identified for both *contextual* and *task performance behaviours* while the dependent variable (y_p) as noted earlier is defined as a measure of the PMs' *performance outcome*, in terms of environmental impact, customer satisfaction, quality and cost-time.

7.2. 2 Stepwise Selection

Given the large number of independent variables identified for this study, it was decided to use the stepwise selection technique in this analysis (see also Chan and Kumaraswamy, 1999). Stepwise selection is the most sophisticated technique of the multiple regression analysis when large independent variables are involved (Brace et al, 2003). Here, each variable is entered in sequence and its value assessed. If adding a variable contributes significantly to

the predictive qualities of the model, then it is retained, but all other variables in the model are then retested to see if they are still contributing to the success of the model. If they no longer contribute significantly, they are removed.

Thus, stepwise selection ensures that the regression ends up with the smallest possible set of predictor variables in the final model. Thus, a key advantage of using stepwise is that it results in the most parsimonious model (Walliman, 2001; Brace et al, 2003).

Here, the objective was to explore the relationships between the *performance outcome* as perceived by property developers in MHBPs using the *contextual* and *task behavioural measures* as independent variables. Prior to developing the model, it was important to have a fair idea of how closely a change in one variable is tied to a change in another variable and vice versa and also whether multicollinearity existed among the predictors. In particular, predictors that correlate highly with each other (i.e. $r > 0.9$, where r is Pearson's correlation coefficient) should be a source of concern (Blaikie, 2003; Brace et al, 2003; Field, 2005). The Pearson's correlation (r) (see correlation matrix on Appendix 14) revealed that reasonable correlations existed amongst all the variables (i.e. $r < 0.9$) and thus were rationally acceptable to be included in the stepwise analysis (see for instance *ibid*) (see enclosed A3 sheet for more readable version of correlation matrix).

Generally, the Pearson's correlation (by virtue of a 2-tailed test) demonstrated that a large number of the variables were significant at $p < 0.01$ (Appendix 14). This is an indication that, generally the independent variables which correlate reasonably well with the performance outcome have to a large extent been appropriately identified (see for instance Blaikie, 2003).

Table 7.1 presents a summary of the results for the regression analysis. In stepwise regression each variable is entered in sequence (i.e hierarchical) and its value assessed until all variables significantly contributing the to criterion variable are identified. Because of the sequential assessment different models are developed at each stage until the optimum (i.e. the most rigorous) model is identified. Subsequently here the analysis indicates that seven models were developed (Table 7.1). However, the Table shows that model number 7 is the optimum model as it included the smallest possible set of predictor variables.

The model numbers as shown in the first "column"(Table 7.1) give the minimum number of variables extracted whilst R represents a measure of the correlation between the observed value and the predicted value of the criterion variable (i.e. the *performance outcome*). R square (R^2) is a measure of this correlation and indicates the proportion of the variance in the criterion variable which is accounted for by the model. Thus, R^2 is a measure of how

good a prediction of the *overall performance outcome* can be made by knowing the predictor variables (Field, 2000; 2005). However, R^2 tends to somewhat over-estimate the success of the model when applied to the real world, so an adjusted R^2 value is calculated which takes into account the number of variables in the models and the number of observations (i.e. participants) the model is based on (Brace et al, 2003).

Thus, the adjusted R^2 is useful because it gives an indication of how much of the variance in the *performance outcome* is accounted for in the population from which the sample was chosen. Subsequently, using the adjusted R^2 and the analysis of variance (ANOVA) (Table 7.2), the following conventional statistical report was extracted from table 7.1:

(Adjusted $R^2 = 74.4$; $F_{7, 49} = 24.30$, $p < 0.0005$)
(7.6)

Given that the p value (as shown above) is less than 0.0005, the report indicates that model number 7, which accounted for seven variables out of the total tested is the most parsimonious model accounting for approximately 74% of the variance in the *performance outcome*. The p-value (reported in the ANOVA Table) also assesses the overall significance of the model. As $p < 0.0005$, it confirms that model is significant. The Durbin-Watson test also recorded a reasonable figure of 2.095 suggesting that the

residuals errors are not correlated or are independent of each other (Table 7.1) (see for instance Field, 2005).

The emerged model indicates that 74.4% of the variance in the PMs *performance outcome* can be explained by the seven variables extracted namely: *job knowledge of appropriate site layout techniques for repetitive construction works; dedication in helping work contractors to achieve work programmes; job knowledge of appropriate technology transfer for repetitive construction works; effective time management practices on all project sites; ability to provide effective solutions to conflicts while maintaining good relationships; ease with which works contractors can approach the PM; and volunteering to help works contractors solve personal problems.*

The beta value (i.e. estimated regression co-efficient) is a measure of how strongly each predictor variable influences the criterion variable and is discussed in detail later in section 7.3.2 (see also Table 7.3). However, prior investigation revealed that the t and p-values associated with the co-efficients for the respective variables proved significant (at $p < 0.0005$). This provides reasonable evidence that the seven independent variables can be used to predict the potential performance of PMs in MHBPs.

Subsequently, the following model equation is derived using the respective co-efficients

$$Y_p = 0.702 + 0.356 (\text{Knsterep}) + 0.277 (\text{Dediprog}) + 0.259 (\text{Knthcrep}) + 0.267 (\text{Timemgmt}) + (-0.366) (\text{Abilcon}) + 0.203 (\text{Easeproj}) + 0.192 (\text{Volhelp}) \quad (R^2 \text{ adjusted} = 74.4) \dots\dots\dots (7.7)$$

In the equation above (7.7), Y_p = the predicted performance outcome and the acronyms representing the independent variables are defined as Knstlrep = *job knowledge in site layout techniques for repetitive construction works*; Dediprog = *dedication in helping to achieve works programme*; Kntchrep = *job knowledge in technology transfer for repetitive construction works*; Timemgmt= *time management practices on house-units*; Abilcon = *ability to solve conflicts while maintaining good working relationships*; Easeproj = *ease with which works contractors can approach PM*; Volhelp = *volunteering to help works contractors solve personal problems*.

The implication of equation 7.7 is that the independent variables identified (*except ability to provide effective solutions to conflicts*) have a positive relation with the *performance outcome* herein identified as meeting environmental, customer satisfaction, quality and cost-time targets. That is in terms of “project factors” that are within the control of PMs the appropriate use of these behavioural competencies should provide a firm foundation towards improving their managerial performance in meeting success targets in MHBPs. This suggests that to help improve their managerial performance in achieving the *performance outcome*, PMs should

(*inter alia*) have the potential of improving their knowledge and skills in these independent variables.

Table 7.1: Model Summary showing results of stepwise regression
Model Summary(h)

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics					Durbin-Watson
					R Square Change	F Change	Df1	df2	Sig. F Change	
1	.666(a)	.443	.433	.28475	.443	43.771	1	55	.000	2.095
2	.768(b)	.589	.574	.24678	.146	19.230	1	54	.000	
3	.821(c)	.673	.655	.22212	.084	13.652	1	53	.001	
4	.837(d)	.700	.677	.21501	.026	4.566	1	52	.037	
5	.850(e)	.723	.696	.20854	.023	4.277	1	51	.044	
6	.870(f)	.758	.729	.19703	.035	7.133	1	50	.010	
7	.881(g)	.776	.744	.19118	.019	4.106	1	49	.048	

a Predictors: (Constant), Knowledge of appropriate site layout techniques for repetitive construction works

b Predictors: (Constant), Knowledge of appropriate site layout techniques for repetitive construction works , Dedication in helping works contractors/and or artisans to achieve work programmes

c Predictors: (Constant), Knowledge of appropriate site layout techniques for repetitive construction works , Dedication in helping works contractors and/or artisans to achieve work programmes, knowledge of appropriate technology transfer for repetitive construction works

d Predictors: (Constant), Knowledge of appropriate site layout techniques for repetitive construction works , Dedication in helping works contractors and/or artisans to achieve work programmes, knowledge of appropriate technology transfer for repetitive construction works, Effective time management practices on all project sites

e Predictors: (Constant), Knowledge of appropriate site layout techniques for repetitive construction works , Dedication in helping works contractors and/or artisans to achieve work programmes, knowledge of appropriate technology transfer for repetitive construction works, Effective time management practices on all project sites , Ability to provide effective solutions to conflicts while maintaining good relationships

f Predictors: (Constant), Knowledge of appropriate site layout techniques for repetitive construction works , Dedication in helping works contractors and/or artisans to achieve work programmes, knowledge of appropriate technology transfer for repetitive construction works, Effective time management practices on all project sites , Ability to provide effective solutions to conflicts while maintaining good relationships, Ease with which works contractors and/or artisans are able to approach project manager with their problems

g Predictors: (Constant), Knowledge of appropriate site layout techniques for repetitive construction works , Dedication in helping works contractors and/or artisans to achieve work programmes, knowledge of appropriate technology transfer for repetitive construction works, Effective time management practices on all project sites , Ability to provide effective solutions to conflicts while maintaining good relationships, Ease with which works contractors and/or artisans are able to approach project manager with their problems, Volunteering to help works contractors and/or artisans solve external difficulties

h Dependent Variable: performance outcome

Note: the above indicates the order in which the variables were added

Thus, the implication of this finding is that while it might be important for PMs to have all the necessary competencies relating to the management of MHBPs, the presence of the competencies identified are likely to enhance the achievement of higher performance levels on these projects. That is, while the knowledge of other related competencies might help in delivering some required level of managerial performance in MHBPs, the knowledge of these competency profiles will help increase the PMs' chances of achieving managerial excellence.

The negative regression coefficient of the variable *ability to provide effective solutions to conflicts while maintaining good relationships* suggests that it has a negative impact on performance outcome. This seems to deviate from conventional wisdom and further discussion on it is provided in section 7.3.2.

7.2.2 Test of goodness of fit

In developing the regression model, the aim was to try and maximise the measurement of the adjusted R^2 which is a measure of good-fitness. As already pointed out in the previous section, an adjusted R^2 of 74.4% (model 7) is appreciably high and this suggests that the model is a relatively good model. Analysis of variance (ANOVA) (Table 7.2) also indicated that the regression equation (i.e. equation 7) is significant (i.e. at $p < 0.0005$). The

Durbin-Watson test (see Table 7.1) also recorded an acceptable figure of 2.095 suggesting that residual errors are not correlated or conform to the assumptions of normality. These encouraging test parameters are further indications of the goodness of fit of the model.

In order to check the potential influence of multicollinearity, two diagnostic tests, tolerance and variance inflation factor (VIF) were undertaken as part of the beta standardised regression coefficients (see Table 7.3). Multicollinearity is used to check whether high correlations exist among the sets of predictor (independent) variables in the regression model. The tolerance values are a measure of the correlation between the predictor variables and can vary between 0 and 1. According to Brace et al (2003), the closer to zero the tolerance value is for a variable, the stronger the relationship between this and other predictor variables. However, Brace et al, (2003) cautions that one should be concerned about such very low tolerances (i.e. tolerances close to zero). Alternatively, this means that any variable with a VIF of more than 2.0 should be a source of concern (see Blaikie, 2003).

Table 7.2: Analysis of Variance (ANOVA) for Optimum Regression Model

Model	Sum of squares	Degrees of freedom	Mean Square	F	Significance
Regression	6.218	7	.888	24.303	.000
Residual	1.791	49	.037		
Total	8.009	56			

Table 7.3 (containing the diagnostic test) shows that the lowest tolerance is 0.495 whilst the highest is 0.603. The relatively high values suggest low level of collinearity in the predictor (independent) variables. Similarly the VIF values for all variables were within the reasonably accepted limit of 2.0. In this respect it could safely be confirmed that there was no issue of multicollinearity regarding the independent variables.

Table 7.3: Coefficients /Collinearity diagnostic of Optimum Regression Model

Variable description ^b	β^c	σ^d	β^e	t^f	Significance ^g	Tolerance ^h	VIF ^j
(Constant)	.702	.238		2.949	.005		
Knowledge of appropriate site layout techniques for repetitive construction works	.190	.047	.356	4.096	.000	.603	1.569
Dedication in helping works contractors to achieve work schedules	.134	.043	.277	3.142	.003	.585	1.709
Knowledge of appropriate technology transfer for repetitive construction works	.125	.040	.259	3.098	.003	.652	1.533
Effective time management practices on all project sites	.165	.050	.267	3.321	.002	.707	1.413

Ability to provide effective solutions to conflicts while maintaining good relationships	-1.80	.047	-.366	-3.811	.000	.495	2.020
Ease with which works contractors are able to approach the Project manager with their problems	.087	.039	.203	2.225	.031	.546	1.831
Volunteering to help works contractors solve external difficulties	.082	.040	.192	2.026	.048	.507	1.971

^aVariable acronym as in equation (7.7)

^bVariables as defined in equation (7.7)

^cRegression coefficient

^dStandard error of variable regression coefficient

^eStandardized regression coefficient which gives measure of the contribution of each variable to the model

^fValue of t-statistics

^gSignificance of t-statistics

^hTolerance for multicollinearity measure

^jVariance inflation factor for multicollinearity measure

7.2.3 Residual Analysis

The test made on the estimated regression coefficient is dependent on the assumption that the sample points are randomly selected and each comes from identically distributed normal populations of data all with the same variance. A residual analysis can be used to establish the validity of the model in satisfying this condition (Field, 2000; Field, 2005; Faircoulgh, 2006). Thus, given the multiple regression model,

$$y = \alpha + \beta_1 x_{1i} + \beta_2 x_{2i} + \dots \beta_K x_{Ki} + \varepsilon_i \dots \dots \dots (7.8)$$

Where, ε the residual error is normally independently distributed with mean 0 and variance σ^2 . According to Field (2005), the residual errors can be used to check the validity of the model by undertaking residual analysis. Supposedly, if the multiple regression $y = a + b_1 x_1 + b_2 x_2$ is fitted to a known data and obtained some equation in terms of \tilde{y} , then the residuals can be calculated by establishing the $(y - \tilde{y})$ values. Subsequently the sum of the squares of the residual (residual SS) is given by $\Sigma(y - \tilde{y})^2$.

If the analysis is being carried out using a computer package, then the approximated normality of the residuals can be checked using normal probability plots (Field, 2000: 2005). This is done by calculating the expected cumulative probability and plotting it against the observed cumulative probability. If the multiple regression model is appropriate, then the standardized residuals should normally be distributed with mean 0 and standard deviation 1. It is also known that 95% of the values of a standard normal variable would usually be in the interval -2 to +2 and 99.7% in the interval -3 to +3 (see Field, 2000; Fairclough, 2005; Field, 2005). Besides the normal probability plot should lie close to a straight line (ibid).

Using SPSS, the histogram for the regression standardized residual is reproduced as in Figure 7.1. The distribution of the histogram suggests some normality in the data. The normal probability plot is also shown in figure 7.2. The normal probability plot shows that the points lie close to the straight line indicating that the residuals are approximately normally distributed. Note also that the Durbin-Watson test (as earlier reported) indicated that the residual errors are independent or not correlated.

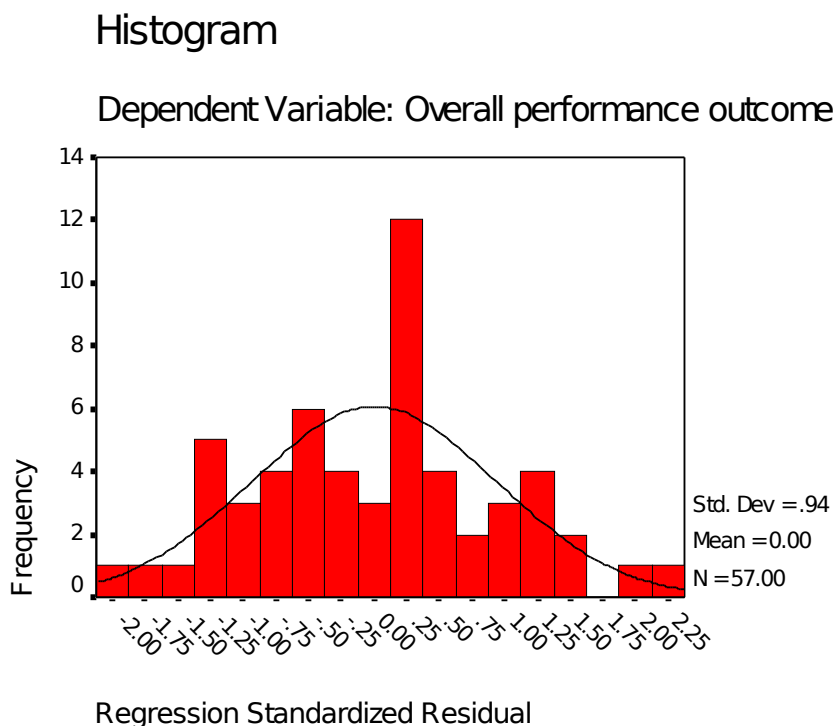


Figure 7.1: Histogram for frequency against regression standardized residual

These results provide reasonable compelling evidence that the substantive model developed is valid. The graph of unstandardized predicted value against standardized residuals is shown in figure

7.3. The results also indicate that the residual between parallel horizontal lines lie at about +2 and -2. Furthermore, there was no clear pattern in the scatter plot confirming that the regression equation is robust.

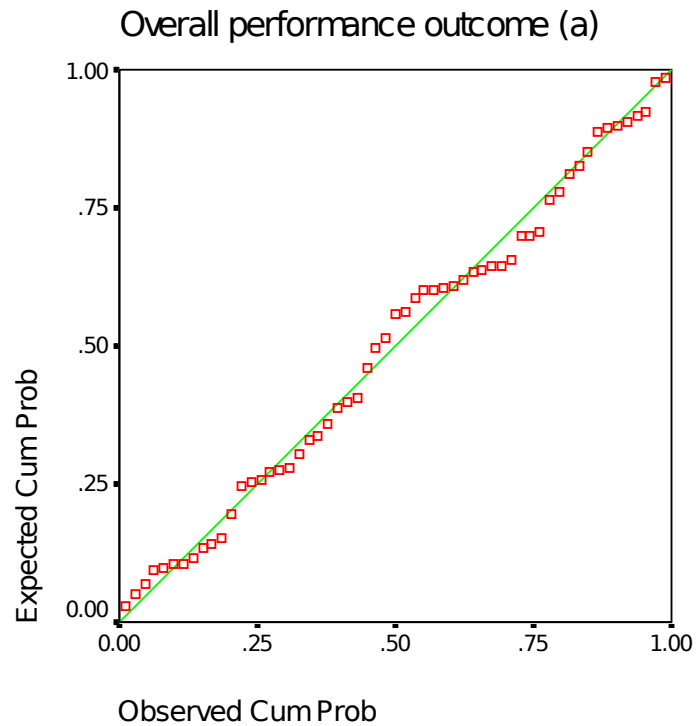


Figure 7.2: Normal probability plot of regression standardised residual

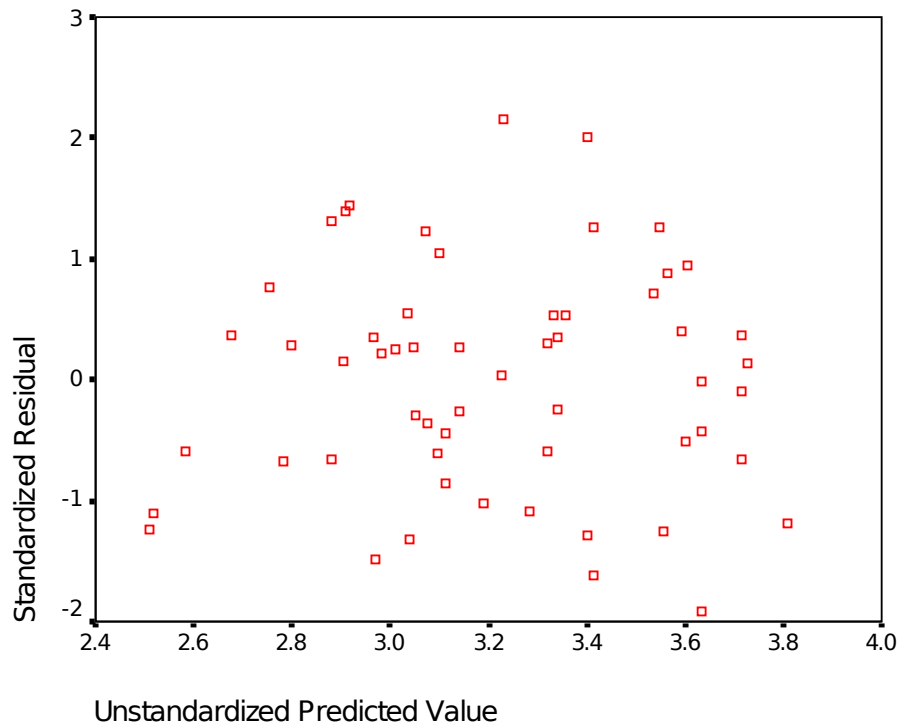


Figure 7.3: Scatter of standardized residual against unstandardized predicted value

7.3 DISCUSSION OF THE RESULTS

Section 7.2.1 has described the optimum statistical model for predicting the performance of PMs in MHBPs. This optimum model was obtained through accepted regression modelling practices. The regression technique included maximizing the R^2 value by adding through stepwise selection technique variables that are statistically significant. As already noted, the main objective of this study was to help develop a model for predicting the potential performance of PMs in MHBPs in Ghana. The motivation for the study stems from the increasingly important role that PMs are playing in the management of MHBPs in the Ghanaian

construction industry, and the subsequent necessity for an empirically structured system to help validate their managerial performance towards best practice improvement (Amoa-Mensah, 2002; Ahadzie et al, 2004; 2005a; 2006.) Here, the discussion of the findings (including potential implications for PMs' performance improvement in MHBPs) is argued in the context of how they converge with the body of literature in the HRM genre especially the underlying theoretical framework from applied psychology. Thereafter, the significance of the individual variables towards engendering effective managerial performance of PMs is elucidated.

7.3.1 Convergence of Findings with the Theoretical Framework Adopted

As demonstrated in chapter two, there is a growing awareness within the construction industry of the relationship between project success and PMs' competencies. Similarly, it is becoming increasingly apparent that, competency-based models are useful for enabling an understanding of the professional development required to engender the appropriate competencies. Accordingly, the contemporary view is increasingly shifting towards competency-based metrics which draw on key behavioural measures (see e.g. Dullaimi et al, 1999; Dainty et al, 2003; 2004; 2005; Cheng et al, 2005; Skipper et al, 2006). Thus, insofar as competency-based measures represent an established recourse towards encouraging the PMs' continuing professional

development, they represent an integral part for addressing a critical variety of HRM actions and outcomes (Tett et al, 2000; Cheng et al, 2005).

Indeed these behavioural measures are useful for providing the psychological understanding needed when selecting and predicting human performance (Motowidlo et al, 1997; Scullen, 2003). These behavioural measures, more than general traits, are amenable to change through training and are useful for identifying training requirements of PMs. Thus, recognising and incorporating these measures in organisational programmes is useful not only for the continuing professional development (CPD) of PMs, but also for their professional competitiveness (Dainty et al, 2003). These are some of the key reasons why the theoretical framework adopted for this study, while emphasising the relevance of *performance outcome* draws significantly on behavioural measures. Subsequently, for ease of reference in the ensuing discussion, the predictor variables have been regrouped to reflect the philosophy of the theoretical framework which is to distinguish *contextual performance behaviours* from *task performance behaviours* (see table 7.4).

It is noted that both aspects of *contextual* and *task performance behaviours* were accounted for in the model suggesting that the established distinction in organisational psychology theory may be empirically relevant for validating PMs' performance measures in

MHBPs (Table 7.4). Borman and Motowidlo (1993) and subsequently Conway (1996) have contended that *contextual performance behaviours* could be accounting for 30% of the variance in managerial performance, and *task performance behaviours* could be accounting for over 50% (see chapter four).

A cursory look at Table 7.4 (reproduced from model summary) shows that in this instance as well, whilst aspects of *task performance behaviours* accounted for about 50% of the variance, aspects of *contextual performance behaviours* accounted for about 24%. The similarity of the findings suggests that the theoretical basis of this research is potentially very relevant for understanding the PMs' performance domain in MHBPs.

Table 7.4: Independent variables accounted in the optimum regression model

Performance domain	Variables included	% variance of individual variables (R^2 change)	Total % variance accounted (R^2)
Contextual Performance behaviours			24.90%
<i>Job dedication</i>	<ul style="list-style-type: none"> Dedication in helping works contractors to achieve works programme 	14.6%	
<i>Interpersonal facilitation</i>	<ul style="list-style-type: none"> Effective time management on all project sites Ability to provide solutions to conflicts while maintaining good relationship Ease with which works contractors are able to approach PMs with their problems Volunteering to help works 	2.6% 2.3% 3.5% 1.9%	

contractors in their personal problems	
Task performance behaviours	52.70 %
<i>Job knowledge</i>	<ul style="list-style-type: none"> Knowledge of appropriate site layout techniques for repetitive construction works 44.3% Knowledge of appropriate technology transfer for repetitive construction works 8.4%
<i>Cognitive ability</i>	Nil
<i>Task proficiency</i>	Nil
<i>Experience</i>	Nil

With regard to the *contextual performance domain*, aspects of *job dedication* and *interpersonal facilitation* were both accounted for, though *interpersonal facilitation* features more in terms of the number of variables included in the model (Table 7.3). This concurs with Borman and Motowidlo's (1997) assertion that, in managerial performance evaluations, the antecedents of *contextual performance behaviours* are more likely to involve personality factors. That is, if aspects of *contextual performance behaviours* are included as criteria for the performance evaluation, then *personality* predictors are more likely to be successful for selection than if they are not included. However, albeit aspects of *interpersonal facilitation* featured more in terms of variables, they do not necessary account for a greater percentage of the total variance of *contextual performance behaviours*.

Job dedication accounted for 14% of the variance whilst aspects of *interpersonal facilitation* accounted for approximately 10%. This

result is also very revealing in the context of the theoretical framework adopted. For instance, Van Scotter and Motowidlo (1996) and Conway (1999) have contested which of these two constructs should be more relevant for judging an individual's job performance. Whilst both researchers concur that aspects of *job dedication* and *interpersonal facilitation* are important, Van Scotter and Motowidlo (1996) suggested that aspects of *job dedication* are only marginally significant relative to *interpersonal facilitation* and would normally be redundant. Alternately, Conway (1999) argued for the contrary especially in regard to managerial job performance evaluation. Here, the findings concur with Conway's (1999) assertion that in managerial job evaluation, aspects of *job dedication* cannot be discounted and could be accounting for more of the variance associated with *contextual performance behaviours*. At least in this sense, the most relevant conclusion is that both aspects of *interpersonal facilitation* and *job dedication* are plausible and distinct variables to be considered for PMs' performance measures in MHBPs.

The only *task performance behaviour* found to be significant was *job knowledge* (Table 7.4). While the inclusion of this variable is not surprising, nevertheless it seems odd that for instance aspects of the constructs "*experience*" and "*task proficiency*" (often implied in construction management literature) (see for instance Edum-Fotwe and McAffer, 2000; Odusami et al, 2003) did not emerge in the findings. Yet, this also converges with the relevant

applied psychology literature (see chapter four). For instance Hunter (1983) and later Schmitt et al (1986) both found (using path analysis) that, in evaluating an individual's job performance, aspects of the constructs; *experience*, *cognitive ability* and *task proficiency* albeit important do largely manifest through their effect on *job knowledge*. Here, the plausible interpretation is that despite the traditionally "task oriented" nature of the construction industry and for that matter MHBPs, PMs are not expected to demonstrate strong involvement in *task proficiency* because they get jobs done through other people (see for instance Conway, 1999). Thus, while the technical skills of the PM might be important because they are not traditionally involved in undertaking most tasks themselves, it seems reasonable that it should not feature prominently the evaluation of their performance.

It is also intriguing that aspects of *cognitive ability* did not feature at all in the findings, even though Borman and Motowidlo (1997) had argued that these are more likely to predict *task performance behaviours*. However, other writers do maintain that while *cognitive ability* is important, (i.e. just like *experience* and *task proficiency*) it also normally manifests itself through *job knowledge* (see for instance Campbell, 1993; Campbell et al, 1996). What is more, McCrae and Costa (1996) adopted a different framework from Hunter (1983) and Campbell (1993), but ended up drawing similar conclusions that *cognitive ability* (among

others) often draws on *job knowledge*. Thus, while it may be valid that the antecedents of *cognitive ability* are more likely to predict *task performance behaviours*, the evidence suggests that their effect on job performance is mediated by other variables such as *job knowledge*.

Admittedly, the construct *experience* when viewed in the global market (e.g. in terms of “seniority” or number of years in a work setting) is well recognised as important criteria for establishing the job potential of PMs (see for instance Ogunlana et al, 2002). However, and as noted earlier in chapter five (page 131), in this thesis, the construct is viewed in terms of its potential effect in relation to the judgment of property developers concerning the performance of PMs on an ongoing (i.e. present) job or task and not as seen on the “labour market” for the purposes of ,say, recruitment exercises. Thus, a plausible deduction from the above finding is that while the behaviours associated with the construct *experience* is an important determinant in helping to make informed decisions on the choice and selection of potentially competent PMs, in considering its effect in respect to the judgment of property developers on an ongoing job or the task at hand, it is rather how any *experience* acquired by the PM is translated into *job knowledge* that seems to matter in the end. Thus, whilst the level of experience of the PM might be important, ultimately, it is how the relevant *behavioural experience* is

successfully translated into *job knowledge* on an ongoing task that might be crucial in judging their current performance.

An important benefit of the *contextual-task* concept is that it provides a framework for having a deeper understanding of the PMs' performance domain (see chapter four). The findings of this study have demonstrated that aspects of both *contextual* and *task performance behaviours* make a significant contribution to the PMs' performance domain in MHBPs. This suggests that the *contextual-task* performance distinction may be conceptually and empirically relevant to other project-based sectors of the construction industry. Given that behavioural competencies are more amenable towards identifying training requirements, the *contextual-task* typology provides the opportunity for a detailed analysis of managerial performance and its effect. The findings of this research could therefore be used to underpin the development of appropriate training programmes for improving the PMs' performance in MHBPs. Subsequently an in-depth discussion of the significance of each of the predictor variables is addressed in the ensuing section.

7.3.2 The Significance of the Competency Profiles towards Engendering the Performance of PMs in MHBP

As reported in the foregoing discussion, in developing the predictive model, it was necessary to distinguish between *task performance behaviours* and *contextual performance behaviours*. While *task performance behaviours* are job specific and are associated with the PMs' technical functions such as organizing, planning, coordinating and controlling, *contextual performance behaviours* are those discretionary job-related acts which informally contribute to organisational effectiveness but are not formally recognized as part of the job. As noted in chapter four, the term "performance" in this research context is defined as the behavioural action of the PM towards achieving the expected outcome. Thus in this respect, the identification of these competency profiles suggest that PMs who have better knowledge in, for instance, *site layout practices and technology transfer* would be expected to exhibit better *task behaviours* associated with these variables than those without such knowledge. Furthermore, if the *task behaviours* associated with these variables (i.e. *site layout practices/technology transfer*) are to lead to better performance outcome in MHBP, then PMs should possess the necessary skills as identified in the remaining variables, these being related to *contextual performance behaviours*.

Here, the R^2 change, the standardised regression co-efficients (i.e. beta), the t-values and the respective p-values have been reproduced and reported in Tables 7.5. The R^2 change is a measure of how the predictive power of the model changes with the addition or removal of the variables identified. The beta values (explained earlier in the regression analysis) are measures of how strongly each variable influences the *overall performance outcome*. Thus, for a variable to be deemed as making a significant contribution, the beta value should differ significantly from zero (see for instance Field, 2000; 2005). Accordingly, the t-values provide a test of the hypothesis that the beta values differ significantly from zero (i.e. the p-value should be less than 0.0005).

Table 7.5: Coefficients of Optimum Regression Model

Variable ^a	Variable description	Beta values	t-values	Significance	R^2 change
NA	(Constant)				.
Knstlrep	Knowledge of appropriate site layout techniques for repetitive construction works	.356	4.096	.000	44.3%
Dediprog	Dedication in helping works contractors to	.277	3.142	.003	14.6%

	achieve work schedules				
Kntchrep	Knowledge of appropriate technology transfer for repetitive construction works	.259	3.098	.003	8.4%
Timemgmt	Effective time management practices on all project sites	.267	3.321	.002	2.6%
Abilcon	Ability to provide effective solutions to conflicts while maintaining good relationships	-.366	-.3.811	.000	2.3 %
Easeproj	Ease with which work contractors are able to approach the Project manager with their problems	.203	2.225	.031	3.5%
Volhelp	Volunteering to help works contractors solve external difficulties	.192	2.026	.048	1.9%

7.3.2.1 Task performance behaviours

Job knowledge of site layout techniques for repetitive construction works

The variable *job knowledge in appropriate site layout technique for repetitive construction works* accounted for 44.3% of the total variance (i.e. out of 74%) (Table 7.5). This is against the background that Borman and Motowilko (1993) and Conway (1999) have confirmed that *task performance behaviours* and *contextual performance behaviours* would normally account for approximately 70% of total variance in managerial performance

evaluations. Therefore for this variable alone to account for more than half of the total variance in the performance outcome suggests that it is critical in determining the managerial excellence of PMs in MHBPs. In addition, the relative strength of the impact of the variable as reflected in the beta value (of 0.359) is shown in both Tables 7.4 and Figure 7.1. The p-value ($p < 0.0005$) suggests that the beta value differs significantly from zero, confirming the relatively stronger contribution of this variable to the *overall performance outcome*.

While the inclusion of *job knowledge in site layout practices* as the most important determinant of the performance of the PM appears contrary to the findings in some existing literature (see for instance Fraser and Zakrada-Fraser, 2003), the high impact value it received here suggest that it can not be discounted in the context of the study area. In particular, the finding suggest that in the Ghanaian context, there might be some underlying managerial issues relating *site layout practices* that property developers feel PMs should probably focus on towards improving their performance on MHBPs. There might therefore be the need for further investigations towards understanding and managing the situation better, especially given that a well planned site can contribute to reducing construction cost and time by minimizing travel time, decreasing time and effort in materials handling, increasing productivity and improving safety and eliminate waste (Pheng and Sui, 1999; Elbeltagi et al, 2002; Ngowi, 2001).

Without a doubt, it should be recognised that, in multiple and large scale projects such as MHBPs, it is more difficult to manage the site layout efficiently due to the vast number of trades and inter-related planning constraints (Tam and Tong, 2003). Thus, further investigations in the context of the study area might help in revealing problem areas that can help PMs to be better focussed towards developing the appropriate competencies for facilitating effective site layout management practices.

Job knowledge in technology transfer for repetitive construction works

Technology transfer as used here is the application of innovations that are new to the property developer and have the potential of significantly improving performance by decreasing installed cost, increasing installed performance and improving the business of the process (Toole, 1997). Many researchers concur that technology transfer has the potential of improving performance outcome (see for example Yang et al 2006). This assertion is also confirmed by the factor analysis in chapter six. However, generally property developers are often reluctant to embrace technology transfer because of the uncertainties surrounding its adoption (Toole, 1997; Yang et al, 2006). Uncertainty as used here relates to the situation where the property developer lacks the relevant information towards making an informed decision on adopting innovations (Toole, 1997).

The finding provides some evidence that the PMs' knowledge in *technology transfer* impact positively on performance outcome (R^2 change of 8.7% and co-efficient of 0.259) (Table 7.4 and figure 7.1). That is, the PMs' knowledge of innovation related activities has the potential of contributing to their being rated as successful in the management of MHBPs. In particular, Toole (1997) has argued that the adoption of innovation by property developers is positively and significantly related to them having an individual with a background in innovation related activities. Thus, given the increasingly strategic role that PMs are playing in MHBPs in Ghana for instance, the findings suggest that their knowledge in innovation related activities could be important towards enhancing their performance. This should therefore also encourage PMs to strive to develop their knowledge and understanding of innovation related activities especially in developing countries where the urge to increase the quantity of housing has often brought to the fore the need for adopting appropriate technology transfer (especially with regard to the use of local materials) (Mehta and Bridewell 2006).

7.3.3.2 The Contextual performance behaviours

Regarding the *interpersonal behaviours* associated with *dedication, time management; ease of approachability of PM, volunteering* and *ability to provide effective solutions to conflicts*,

there are already widespread research studies of the importance of these variables in performance management (see Pheng and Chuan, 2006). From an applied psychology perspective, the reason why these *contextual performance behaviours* are critical is that while they may not be specifically goal oriented, their presence is needed to facilitate the successful achievement of organizational goals.

Job Dedication in helping works contractora achieve works programme

According to Van Scotter and Motowidlo (1996), *job dedication* is the motivational foundation that drives people to act with deliberate intention of promoting an organisations best interest and includes self-disciplined behaviours such as following rules, working hard and taking initiative to solve problems at work. Here, the variable *job dedication in helping works contractors achieve works programme* is associated with the PMs' commitment in helping works contractors to systematically plan and schedule their tasks ahead of execution. In this case the R^2 change recorded approximately 14% (Table 7.5) and beta (0.227) was positively significant at $p < 0.0005$ (Tables 7.5).

It is noted that some researchers have contested the need to separate *job dedication* from *interpersonal facilitation* in performance evaluations. However, Conway (1999) and Scullen et al (2003) have recently shown that *job dedication* makes unique

and significant contribution and needs to be treated separately especially in managerial performance evaluations (see also Wang and Amstrong, 2004). The evidence as reported earlier also suggests that *contextual performance behaviours* would normally account for 30% of the total variance in managerial performance evaluations. Thus for this variable alone to account for approximately half of the potential total contribution of *contextual performance behaviours* affirms the significant contribution this makes towards achieving managerial excellence in MHBPs.

Interestingly *job dedication* has also not been subjected to any rigorous and independent academic studies within project-based sectors such as MHBPs. This is because it is often treated as an inherent part of interpersonal skills, which makes it more or less redundant for specific investigations to understand its impact. However these research findings have revealed that it may be an important aspect of helping to predict/determine the performance of PMs. It might therefore be important for the subject to receive future research attention so that its impact could be fully understood towards improving the performance of PMs in MHBPs.

Interpersonal Facilitation

The remaining variables (namely *time management, approachability, effective conflict resolution and volunteering*) fall under the construct *interpersonal facilitation*. *Interpersonal facilitation* encourages a range of interpersonal acts that help

maintain the social context needed to support organisational effectiveness. The R^2 change for the variables are *effective time management* (2.6%), *ability to provide effective solution while maintaining good relationships* (2.3%), *ease with which PM is approachable* (3.5%) and the *PM volunteering to help works contractors* (1.9%). While these R^2 seem relatively small (as compared to the others) the model results indicate that they are nevertheless significant. Despite these R^2 being relatively small, the t-test suggests that the beta values (Table 7.5) are significantly different from zero (i.e. $p < 0.0005$). This suggests that these competency profiles make a reasonably significant contribution towards predicting the *performance outcome* and therefore could be helpful in improving the PMs' performance. Alternatively, their combined effect in terms of the R^2 change accounts for approximately 10% which is a significant portion of the total variance (i.e. 30%) normally accounted for by *contextual performance behaviours* in managerial performance (see for instance Van Scotter and Motowidlo, 1996).

What is also particularly interesting is that the beta value for the variable *ability to provide effective solutions to conflicts while maintaining good relationships* emerged negative (see figure 7.4). This suggests that it has a negative impact on the performance outcome, which seems to deviate from conventional wisdom. However there is also a reasonable explanation for this.

Generally the issue of conflicts and conflict resolution is a complex issue in the construction process (Leung et al, 2005). The most commonly held view is that conflicts are detrimental to project success and must be eliminated and resolved. Others regard some moderate level of conflict as a catalyst to product/process improvement (ibid). Leung et al (2005) has provided evidence to suggest that in solving conflicts, various approaches tend to have different impacts on the satisfaction of the project participants and hence performance outcome. They argued that, there are basically three established approaches for solving conflicts, namely; emotional/rational which focuses on the cognitive component of conflicts; task/relationship which highlights how individuals differ in the extent to which they attribute conflicts to problems in relationships; and the integration which signifies a “win-win” situation in the interest of all concerned parties. The evidence provided by Leung et al (2005) suggests that, paying too much attention to the former two approaches does not necessarily prove a direct relationship with satisfaction and hence may induce a dysfunctional performance outcome. On the contrary, they found that there is a positive relationship between the integrated approach and the satisfaction of participants. Here, a plausible explanation for the negative coefficient of this variable (*ability to provide effective solutions while maintaining good relationships*) may be that, at least in the Ghanaian situation (and perhaps for many other developing countries), property developers do often experience excessive conflicts amongst works contractors and

moreover, PMs are not able to provide effective solutions towards improving performance. There might therefore be the need for an in-depth study at least in the Ghanaian context in conflicts/conflict resolution towards understanding the situation better and establishing an effective way forward.

It is to be noted that while PMs are accountable for success in project management practice, their effectiveness is only one of many factors that impinges on the outcome of projects. However as noted by Goodwin (1993), the effectiveness of the PM constitutes a critical parameter among the variables that directly affect the performance outcome. It is for this reason that the personal skills of PMs such as those identified here need to be clearly understood by stake holders (property developers in this case) and those aspiring to be PMs.

Given that the data elicited for this study was based on the experience of property developers, the findings provide a clear indication for aspiring and experienced PMs of what property developers expect of them towards engendering managerial excellence in MHBPs. It is therefore contended that the variables identified (herein called competency profiles) should provide the empirical basis on which PMs can aspire to improve their own performance through appropriate professional development. Subsequently the potential application of the model is described in the following section.

7.4 RECOMMENDED APPLICATION OF THE COMPETENCY-BASED PROFILES

Competency models are the first step in developing job-specific profiles and in rating an employee's level of competency against a validated set of measures (Mirabile, 1997). Competency profiles are also important issues presently in a variety of settings including education, business organisations and many other human resource management activities (see for instance Lyons, 2003; Gale, 2003; Ford, 2004; Schultze and Miller, 2004). The predictive model developed in this thesis therefore has potential for application in various HRM practices in MHBPs such as team-deployment and job-matching, recruitment and selection, career development and succession planning and curriculum development for PMs. The recommended details are as follows:

7.4.1 Team Deployment and Job-Matching

It is recognised that an individual's competency profile can be used to reconcile against the competency profile of a job position so that the degree of fit can be established (Spencer and Spencer, (1993) cited in Dainty et al (2003) (Lyons, 2003). Consequently

these competency profiles can be used in practice by property developers for deploying PMs with the appropriate competencies for managerial positions in MHBPs. The model could be used to develop an inservice decision making tool in the event that property developers may want to deploy other categories of staff (e.g. deputy PM and/or project coordinator) who demonstrate some reasonable understanding of the relevant knowledge and skills to assist the PM. Alternatively, if the PM falls sick for example and a replacement is needed as quickly as possible, the checklist so developed could be used to quickly identify the appropriate person. Subsequently the profiles can be used in recruitment and selection as well in succession planning.

7.4.2 Recruitment and Selection

Ogunlana et al (2002) have observed that, one of the key problems often encountered by construction executives in project based industries such as MHBPs is the appointing of the “right” PM. In particular any mismatch has a potential basis for a conflict of interest which can result in differing behaviours and outcomes from an individual (Katz and Kahn, 1978; Arglye, 1994; Pickett, 1998; Dainty et al, 2003). However, competency-based models provide a robust framework that can help circumvent this weakness (see e.g. Dainty et al, 2003). These research findings can therefore be used for administrative purposes with regard to the matching and selection of PMs onto MHBPs. Subsequently,

property developers can apply them so that they can make informed and objective judgments in the selection and/or appointment (including interviewing) of PMs who have the appropriate skills and competencies.

It is also recognised that one of the major problems faced by panellists in many organisations when interviewing is to have an objective framework on which to make informed and uniform decisions (Hartley and Braithwaite, 1979; Roberts, 1998; Lyons, 2003). These findings could therefore be used as an “interviewing checklist” by the property developers so that when selecting potential PMs, the interview panel will have a working framework on which to ask questions and also score points for the PM with the appropriate competencies and skills.

7.4.3 Career Development and Succession

The matching of skills to project based sectors of the construction industry has been recognised as a critical tool for the career prospects and professional development of PMs (see for instance Egbu, 1999). Interestingly, one of the main benefits of competency-based measures is their usefulness for the development of training requirements (Tett et al, 2000; Gale, 2004; Ford, 2004). This is because competency-based measures enable PMs to understand their strengths and weaknesses and, this contributes more effectively to their professional development (Latham et al, 1979:

Brohpy and Kiely, 2002). These competency-profiles could facilitate the CPD of PMs by ensuring that they maintain the currency of the scope of the knowledge and skills that property developers expect of them and are required by the demands of the job. There is therefore the potential for the model to be used for identifying training requirements to help engender the professional development of PMs of MHBPs. Potentially, the simplicity reflected in the findings (in terms of the relatively few variables identified) should make it easy for adaptation by property developers (see for instance Pickett, 1998).

Subsequently, it is contended that these competency profiles could be used as a foundation for developing a knowledge-based tool-kit or a skills charting competency mapping processes (see for example, Lyons, 2003) for which PMs can review, plan and undertake self-assessment of the key knowledge and skills they require to engender their managerial excellence in MHBPs. In this respect these profiles could be built into a point system (i.e. rating system) similar to the Association of Project Management (APM) 4 point plan for professional development so that both aspiring and experienced PMs in MHBPs can undertake self-assessment to review and plan their CPD programmes and also to prove their value and gain recognition of their professional expertise in the management of MHBPs.

Alternatively, property developers could use this model to develop competency-based schemes to reward management for developing competencies in line with their organizational requirements (see for instance Tett et al, 2000; Olomolaiye and Ebgu, 2004; Dainty et al, 2005). To this effect, property developers could use the model to develop in-service training schemes to empower PMs to take action to address the deficiencies in their own competency profiles. Subsequently by regularly monitoring their development via the established profiles, property developers can reward PMs who make efforts to align their performance with their organizational competency training requirements.

Many project-based organisations are under pressure to devise means for retaining and sustaining the commitment of their key managerial staff (see for instance Kyriakidou and Ozbilgin, 2004; Schultze and Miller, 2004). Interestingly, there is the evidence to suggest that human resource personnel are most likely to be committed to an organisation if they are rewarded and valued for aligning their performance to the core objectives of the culture and business environment within the organisation they operate (Amstrong, 2003 cited in Olomolaiye and Ebgu, 2004). The competency profiles developed could also be used as the basis to design competency-based reward schemes for PMs engaged in MHBPs thereby helping to reinforce, the acquisition and implementation of the appropriate knowledge and also sustain their commitment to best practices improvement in future projects.

7.4.4 Curriculum Development

Presently in Ghana (and perhaps many other developing countries) construction project management training is generic and there is very little room for professional development (either by short courses) for specific project-based sectors. For instance, while the implementation of MHBPs is increasingly emerging as a critical foundation for most-project based sectors of the construction industry, very little emphasis is placed on curriculum development towards engendering project management practices in that sector. However as demonstrated by, for instance, Gale (2004), it is possible to develop an industry led programme which could be used for both formal and informal project management professional development. Given the strategic position of MHBPs in many developing countries both in terms of scope and the potential for advancement of improved HRM practices, these findings (inter alia) could therefore be used as a foundation for developing specific curriculae for HRM education and training in the management of MHBPs.

7.5 SUMMARY

This chapter has provided a detailed account of the development of a model for predicting the performance of PMs in MHBPs. The findings suggest that the best predictors of PMs' performance in MHBPs at the construction phase are: *job knowledge in site layout*

techniques for repetitive construction works; dedication in helping works contractors achieve works programme; job knowledge of appropriate technology transfer for repetitive construction works; effective time management on multiple house-units; ability to solve conflicts while maintaining good relationships; ease with which works contractors are able to approach the PM; and volunteering to help works contractors solve personal problems. ANOVA, multicollinearity, the Durbin-Watson test and residual analysis undertaken confirm the goodness of fit of the developed model and indicate that the model is statistically robust

Subsequent to the model development, the results have been discussed in the context of identifying convergence with the basis of the theoretical framework and potential relevance and application in the management of MHBPs. It was argued that based on the findings there is compelling evidence that the *contextual-task* typology is relevant for the PMs' performance measures in MHBPs. It is asserted that, given the potential benefits of competency-based models towards identifying the training needs of PMs, the findings of this study could be used as a foundation towards underpinning their continuing professional development in MHBPs. The next chapter addresses the validation of the model.

CHAPTER EIGHT

CHAPTER EIGHT: VALIDATION OF THE COMPETENCY- BASED PREDICTIVE MODEL

8.0 INTRODUCTION

This chapter addresses the validation of the competency-based model developed for the construction phase of MHBPs in Ghana. The aim of the validation process was to help establish whether the concepts and methodologies used in developing the model are sound and also to establish whether the findings are reliable. Validation also provides a firm background against which, the findings could be generalised. Thus validation is important because it reflects the potential objectivity and reliability of the model.

A generic discussion of the concept of validation is first presented. Thereafter, a methodology for undertaking the validation exercise namely, external and internal validation procedures are introduced. Subsequently, the details involved in both validation procedures as applied in this context are discussed.

8.1 THE CONCEPT OF VALIDATION

The concept of validation has different meanings in the various stages of the research process especially the conceptual, methodological, and empirical domain (Brinberg and McGrath, 1992) (Figure 8.1). At the conceptual domain, the validation can be established (among others) by assessing the effectiveness, internal consistency, testability and adaptability of the concepts used. At the methodological domain, it would be expected that efficiency, power (rigour), unbiasedness, and explicitness would prevail. Alternatively at the substantive domain, it would be expected that the research should be beneficial or relevant in terms of any potential practical applications and should also be subject to replication and convergence towards identifying its boundaries (Figure 8.1). Thus, after the development of the substantive model, its generalization and transferability have to be validated to ensure that it represents the characteristics of the general population and that they are not specific to the samples used in the estimation.

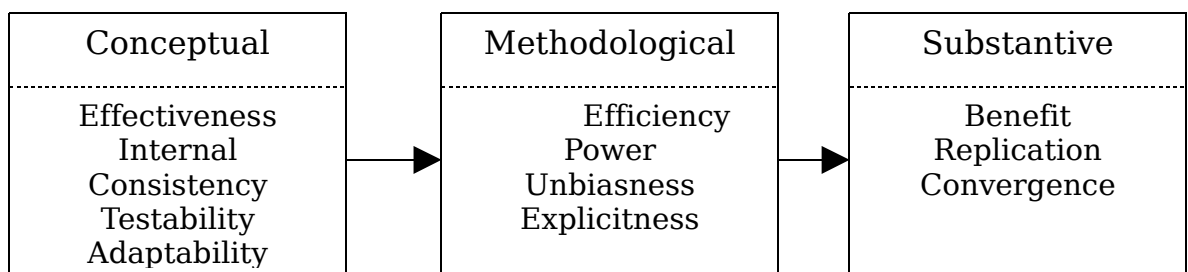


Figure 8.1: Framework of validation

Source: Adapted from Brinberg and McGrath (1985)

In principle, any attempt at validating a research process should reasonably aim at integrating the three domains and a plausible methodology for assessment is for the researcher to strive towards value, correspondence (or fit) and robustness (Brinberg and McGrath, 1992). Value in this sense deals with the worthiness (or added value) of the research, while correspondence is the degree at which the features of the relations in the various domains match or fit together. Robustness deals with testing the consistency of the empirical findings through replication, convergence and differentials (see also Walliman, 2000). That is, robustness deals with the wider issue of generalizability or as is often called external validity (Brinberg and McGrath, 1985; Bailey, 1987;; Blaikie, 2003).

It is interesting to note that while reseachers agree that both internal and external validation are important for validating the research process, the literature is largely silent on what form the internal validation process should to take (see for instance Fellows et al, 2003). A useful technique that has been employed successfully in recent times to achieve this integration is the two dimensional methodology identified as; external and internal validation (see for instance, Proverbs, 1998; Xiao, 2002). External validation is particularly used in respect of the substantive domain of the research process while internal validation has been applied

to the conceptual and methodological domains. Both validation processes are now described in respect of this study.

8.2 EXTERNAL VALIDATION

Various external validation techniques are discussed including the choice made for the purpose of this study. Details of the results are then presented.

8.2.1 Background to the External Validation Analysis

Five main techniques have been identified for undertaking external validation (Snee, 1977; Good and Hardin, 2003; Field, 2005). These are:

- 1) Using independent verification obtained by waiting until the future arrives or through the use of surrogate variables.
- 2) Splitting the samples and using one part for estimating the model and the other for validation.
- 3) Re-sampling, taking repeated samples from the original sample and refilling the model each time.
- 4) Using Stein's equation of re-calculating the adjusted coefficient of determination (R^2) (Field, 2005).

- 5) Approaching experts to comment on relevant aspects of the model including potential benefits (Brinberg and McGrath, 1985).

As a result of resource constraints (in particular financial and time limits), using independent verification when the future arrives was an option that could not be pursued here. The re-sampling procedure was also discounted because as noted by Field (2005), researchers particularly in social science related research such as this rarely have sufficient data to perform this kind of analysis. While splitting the sample seems to be the easier option, it also sometimes suffers from the same problem as re-sampling if the data is not large enough (Good and Hardin, 2003; Field, 2005). However, Brown (1975) had suggested that instead of splitting one can adopt what is termed “pool aside”. The proposition is to set some of the data aside for validation purposes in which the mean square errors (i.e. the residuals or predictive fit) can be used for validation. If this methodology is adopted then Picard and Berk (1990) implies that errors can be minimised by using approximately $1/4^{\text{th}}$ of the sample set aside for developing the model for the validation.

Alternatively, Stein’s equation re-calculates the adjusted R^2 and so can be used for validation (Field, 2005). According to Field the equation used in calculating the adjusted R^2 in SPSS is somewhat flawed because it does not account for how the regression model

would predict an entirely different set of data. Stein's equation addresses this flaw and thus reflects how well the model will predict an entirely different set of data (Stevens, 1992; Field, 2000; 2005). That is, Steins equation is a measure of how well the model can predict scores of different samples from the same population. Stein's equation for validating models is given by:

$$\text{Adjusted } R^2 = 1 - \left(\frac{\frac{n-1}{n+1}}{n-k-1} \right) \left(\frac{n-2}{n-k-2} \right) (1 - R^2) \quad \text{..(8.1)}$$

Where, R^2 is the unadjusted value, n is the number of cases and k is the number of predictors in the model,

Given that in this study, the data collected was not very large in relative terms, a "cross-validation" process was used involving the "pool aside" technique and Stein's equation. The "pool aside" involved the use of 12 independent data (i.e. held-back data) not previously used in the model development. In view of the proposals made for the recommended application of the model (section 7.4), it was also decided to consult some "experts" (i.e. property developers, PMs and construction management academicians) to comment on the potential relevance.

8.2.2 Test Results for External Validation

Here, the validation is discussed in terms of assessing predictive accuracy of the model across different samples from the population and the potential relevance of the findings with respect to, in particular, the recommended application in Ghana.

8.2.2.1 Predictive accuracy across samples

There are three methods of calculating the predictive fit: the mean absolute value (MAD), the predictive mean squares error (MSE) and the mean absolute percentage error (MAPE). The MAD is the average of the absolute values of each residual (i.e. the difference between the observed values and the predicted values from the model). MSE is the average of the squared residuals and MAPE is the average of the absolute percentage error for each predicted value (Good and Hardin, 2003; Xiao, 2003). Among the three, the MAPE is preferred as a predictive accuracy measure as it is a relative one (Xiao, 2003 citing Makridas et al, 1983).

The MAPE measures the magnitude of the errors incurred by the forecast. Drawing from the observation made by Xiao (2003), it was decided to use the MAPE to undertake the external validation. Subsequently using the regression equation obtained from the model, the predicted values were calculated using the scores of 12

respondents whose data were held back. Thereafter the residuals of the actual and predicted performance scores were calculated as shown in Table 8.1. Subsequently, the MAPE is calculated as shown in Table 8.2. The MAPE is computed using $|(e/y_t)|/n$ where y_t is the predicted y over time t and n is the sample size used for validation.

The result gives a MAPE of less than 5% and this corresponds well with the relatively high R^2 achieved for the model. Furthermore, this MAPE compares favourably with many other multiple regression models in construction management research such as 7.30% from Akintoye and Skitmore (1994), 6.99% from Goh (1999), 10% from Chan and Kumaraswamy, (1999) and 5.25% from Xiao (2003). The predictive accuracy of the model is acceptable relative to conventional validation results in construction management research.

Table 8.1: Tabulation of residuals

Respondent	Yo (Actual)	\tilde{y} (predicted)	$Yo-\tilde{y}$ (residuals= e)
1	3.17	4.28	-1.11
2	2.85	4.97	-2.12
3	3.74	5.77	-2.03
4	3.10	5.47	-2.37
5	3.08	4.82	-1.86
6	2.95	4.27	-1.32
7	2.95	4.73	-1.78
8	3.46	2.68	-2.38
9	3.06	4.87	-1.81
10	2.41	3.90	-1.49
11	3.09	4.56	-1.47
12	3.19	4.87	-1.68
		Σ	21.42

Table 8.2: Calculation of mean absolute percentage errors

MAD $\Sigma e /n$	MSE $(\Sigma e^2/n)$	MAPE $\Sigma (e/y_t) $
		/n
0.38	8.04	3.57%

The MAD and MSE values also indicated the variation of the predicted value from the model. These values also compared favourably with, for instance, Xiao's (2003) of 0.37 and 17.28 respectively.

Hereafter, the adjusted R^2 was also undertaking to establish whether it will provide reasonable support to the predictive accuracy.

The adjusted R^2 using Stein's equation resulted in the following:

$$\text{Adjusted } R^2 = 1 - \left(\frac{\frac{57-1}{57+1}}{\frac{57-7}{57-7-2}} \right) \left(\frac{57}{57-7-2} \right) (1 - 78\%)$$

Thus Stein's adjusted $R^2 = 69\%$

Stein's equation also confirms that the model has the potential of predicting quite well different samples of data from the population.

In effect, this cross-validation exercise has indicated that the model developed has the potential for achieving reasonable predictive accuracy. That is, there is reasonable evidence to suggest that the model reflects the characteristics of PMs' performance and practices in MHBPs in Ghana and could be applied in other developing countries particularly those in sub-Saharan African (SSA) where the conditions are likely to be very similar. Ultimately, it must be said that stochastic models such as the one developed in this study are not absolutely perfect and it is worth readers reflecting on this towards the potential application of the model (Hair et al, 1998; Walliman, 2001; Field, 2005).

8.2.2.2 Feedback from experts on the potential relevance of the findings viz. recommended application

Preamble

While these mathematical approaches are indeed useful for establishing external validity, it is also often important to assess any intended benefits of the model by, for instance, assessing how potential users (i.e. practitioners and experts) view the relevance of the findings (Brinberg and McGrath, 1985) (Figure 8.1). That is, apart from establishing the predictive validity of models, it is also useful to approach experts and practitioners to assess whether the models correspond with reality.

It would be recalled that in the pilot and main surveys, a representative of the KNUST was contacted to assist in the

delivery and retrieval of the questionnaires. Currently, a major housing programme (among many others across the country) is being implemented less than 2 km from the outskirts of the KNUST and the opportunity was used to help validate any potential benefits of the model.

Project description

The project (an affordable mass housing building project sponsored by the GoG) commenced in the later part of 2006 and is located at *Ayigya* a suburb of *Kumasi*, (the second largest city of Ghana) and less than 1.5 km from the KNUST. The total project site covers an area of approximately 30 hectares (50 acres) and comprises the construction of 66 No. 4-storey block apartments of 1- bedroom and 2-bedroom types including a living room, dining, kitchen, store, toilet and bathrooms and shopping area. The total contract sum is estimated to be in the region of about 250 billion cedis (approximately 16 million pounds sterling at current exchange rate)). Works in hand presently involves the completion of structural core to roofing level and the first stage of the fixing of services. 11 property developers are engaged on the site with each handling up to six apartment blocks.

Data collection

As documented in section 5.3.6 in the research methodology (chapter five), to help validate the potential relevance of the recommended application of the model a “one- page”

questionnaire was sent to the representative (at the KNUST) to be targeted at property developers and their PMs on the ongoing project (Appendix 16). The sample size targeted was five property developers (i.e. managing directors) and five PMs who work for the property developers identified. Also targeted were five construction management academicians (of the KNUST). The “one-page” questionnaire as noted earlier in the research methodology were sent on the 31st May 2007 and distributed on 1st June 2007. Given the simplicity of the questionnaire (and also the fact the all the respondents particularly the property developers were operating on the same project site), all completed questionnaires were retrieved within four days and faxed back to the UK on 6th June 2007.

Tables 8.3, 8.4 and 8.5 provide details of the feedback received. The questionnaire (Appendix 16) first introduced the variables identified in the model development and asked the respondents to assess on a scale of 1-5 the importance of the variables identified in the research for engendering the performance of project managers in MHBPs in Ghana. Generally, there was consensus amongst the set of respondents with over 90% indicating these variables as either important or very important (Tables, 8.3, 8.4 and 8.5).

Table 8.3: Feedback from property developers in respect of findings
(No. of respondents = 5)

Themes (Variables) n =5	Rating				
	Not very import ant	Not Import ant	Average	Importa nt	Very impotant
	1	2	3	4	5
Knowledge in site layout techniques	0(0)	0(0)	0(0)	2(40)	3(60%)
Knowledge of appropriate technology transfer	0(0)	0(0)	1(20%)	1(20%)	3(60%)
Dedication of the PM	0(0)	0(0)	0(0)	2(40%)	3(60%)
Ability to provide effective solutions to conflicts			0(0)	1(20%)	4(80%)
Effective time management practices on house-units	0(0)	0(0)	0(0)	0(0)	5(100%)
Ease of approachablilty of the PM by worrks contractors and/ or artisans	0(0)	0(0)	0(0)	3(60%)	2(4%0)
Volunteering to help works contractors and/or artisans solve personal problems	0(0)	1(20%)	1(20%)	3(60%)	0(0)

Note: Outside bracket represents number of respondents

Table 8.4: Feedback from project managers in respect of findings (No. of respondents = 5)

Themes (variables)	Rating				
n=5	Not very impport ant	Not Import ant	Average	Importa nt	Very impotant
	1	2	3	4	5
Knowledge in site layout techniques	0 (0)	0(0)	0(0)	2(40%)	3(80%)
Knowledge of appropriate technology transfer	0 (0)	0(0)	0(0)	3(60%)	2(40%)
Dedication of the PM	0(0)	0(0)	0(0)	2(40%)	3(60%)
Ability to provide effective solutions to conflicts	0(0)	0(0)	1(20)	2(40%)	1(20%)
Effective time management practices on house-units	0(0)	0(0)	0(0)	3(6%0)	2(40%)
Ease of approachability of the PM by works contractors and/ or artisans	0(0)	0(0)	1(20%)	2(40%)	2(40%)
Volunteering to help works contractors and/or artisans solve personal problems	0(0)	0(0)	2(40%)	3(60 %)	0(0)

Table 8.5: Feedback from academics in respect of findings (No. of respondents=5)

Themes (variables)	Rating				
n =5	Not very impport ant	Not Import ant	Average	Importa nt	Very impotant
	1	2	3	4	5
Knowledge in site layout techniques	0(0)	0(0)	0(0)	1(20)	4(100%)
Knowledge of appropriate technology transfer	0(0)	0(0)	1(20%)	1(20%)	3(60%)
Dedication of the PM	0(0)	0(0)	0(0)	0(0)	5(100%)
Ability to provide effective solutions to conflicts	0(0)	0(0)	0(0)	2(40%)	3(60%)
Effective time management practices on house-units	0(0)	0(0)	0(0)	1(20)	4(80%)
Ease of	0(0)	0(0)	1(20)	1(20%)	3(60%)

approachability of the PM by works contractors and/or artisans					
Volunteering to help works contractors and/or artisans solve personal problems	0(0)	0(0)	1(20%)	2(40%)	2(40%)

The respondents were also asked questions relating to whether they agree that it is important to further develop the findings into a management checklist for practical application in Ghana; consider it important for the themes to be used as a management checklist to be used by property developers; consider the themes to important to used used for curriculum development and their willingness to use the toolkit when developed (Tables 8.6, 8.7 and 8.8). In this case too the feedback suggests that there was somewhat overwhelming support that the potential application of the findings would be welcomed and beneficial (ratings of important and very important in most cases). It was also encouraging to note the PMs largely concur to the feedback suggesting that there is the potential for development of the toolkit if developed for training purposes.

While the sample size used for this validation exercise is relatively quite small for each set of consensus reached, the feedback, in particular, the convergence achieved is generally encouraging and generates some confidence that the developed model in in congruence with the reality in Ghana and that, the recommended application has the potential of being well received.

Table 8.6: Feedback from property developers in respect of potential recommended application (respondents = 5)

Themes (variables) n = 5	Rating				
	Not very impporta nt	Not Importan t	Average	Importan t	Very impotent
	1	2	3	4	5
Do you agree that it is important to, further develop these themes into a management toolkit/checklist for practical application in Ghana? Please circle the appropriate number.	0(0)	0(0)	0(0)	2(40%)	3(60%)
Would you consider it important for these themes to be further developed into a management checklist, so that property developers can use them as a guide for recruiting and appointing potential project managers for MHBPs?	0(0)	0(0)	0(0)	3(60%)	2(40%)
Would you consider it important for the themes identified above to be further developed as a foundation for curriculum	0(0)	0(0)	0(0)	1(20%)	4(80%)

development, for the training of project managers in the management of MHBPs in Ghana?					
Please indicate your willingness to use the management toolkit/checklist if developed for practical application.	0(0)	0(0)	0(0)	0(0)	5(100%)

Note: Outside bracket represents number of respondents

Table 8.7: Feedback from project managers in respect of potential recommended application (respondents = 5)

Themes (Variables) n = 5	Rating				
	Not very impporta nt	Not Importan t	Average	Importan t	Very impotent
	1	2	3	4	5
Do you agree that it is important to, further develop these themes into a management toolkit/checklist for practical application in Ghana? Please circle the appropriate number.	0(0)	0(0)	0(0)	3(60%)	2(40%)
Would you consider it important for these themes to be further developed into a management checklist, so that property developers can use them as a guide for	0(0)	0(0)	1(20%)	2(40%)	2(40%)

recruiting and appointing potential project managers for MHBPs?					
Would you consider it important for the themes identified above to be further developed as a foundation for curriculum development, for the training of project managers in the management of MHBPs in Ghana?	0(0)	0(0)	1(20%)	2(40%)	2(40%)
Please indicate your willingness to use the management toolkit/checklist if developed for practical application.	0(0)	0(0)	0(0)	3(60%)	2(40%)

Table 8.8: Feedback from construction management academics with respect of potential application (respondents = 5)

Feedback variables	Rating				
N = 5	Not very important	Not Important	Average	Important	Very important
	1	2	3	4	5
Do you agree that it is important to, further develop these themes into a management toolkit/checklist for practical application in	0(0)	0(0)	0(0)	1(20%)	4(80%)

Ghana? Please circle the appropriate number.					
Would you consider it important for these themes to be further developed into a management checklist, so that property developers can use them as a guide for recruiting and appointing potential project managers for MHBPs?	0(0)	0(0)	0(0)	1(20%)	4(100%)
Would you consider it important for the themes identified above to be further developed as a foundation for curriculum development, for the training of project managers in the management of MHBPs in Ghana?	0(0)	0(0)	0(0)	0(0)	5(100%)
Please indicate your willingness to use the management toolkit/checklist if developed for practical application.	0(0)	0(0)	0(0)	0(0)	5(100%)

Finally, the respondents were also asked to make their own assessments of the research findings and also offer suggestions on any other way they think the model could be applied for the benefit of the construction industry in Ghana. While many of them re-emphasised that the findings have the potential for improving project management practices in MHBPs in Ghana, there were

some particularly interesting assessments which are worthy of note: For instance, one property developer wrote that;

“The themes are appropriate in application and in development of training programmes for prospective project managers and also to guide other stakeholders such as property developers and governmental agencies” (Appendix 17)

Another property developer wrote thus:

“This will help Ghanaians or Contractors to have basis or foundation to manage projects very well and efficiently. It should be straight forward and understandable to the ordinary contractor.” (Appendix, 18)

A contribution from one of the academics also read thus:

“I think it’s a timely research work which will be very relevant to the Ghanaian construction industry. I think almost all the areas needing attention has been covered in the themes” (Appendix 19)

A contribution from one of the project managers also read thus:

“For any effective implementation, it is recommended that all stakeholders within the hierarchy of property developers should be involved and not just the project managers.” (Appendix, 20)

It is also refreshing to note that it is a PM who is drawing attention to the fact that if potential application of the model is to be successful all stakeholders should be involved. As noted in the earlier part of the research, in project management practice it is believed that the PM should be help accountable for project success. However it is also noted that many of the factors that affect the outcome of projects are outside the control of the PM. The potential for achieving excellent managerial practices therefore requires an integration of work, people, technology and information in concomitance with an organisations strategy and culture (Pickett, 1998). This suggests that other stakeholders involved would have to play their part by making sure that those factors outside the PM are also appropriately integrated and managed to help focus the effective use available resources on the prime task of improved performance levels from PMs. There might therefore be the need for future research to help understand the taxonomy of the many of the other factors outside the control of PMs that could impact negatively on their effort to strive for excellence in the management of MHBP.

8.3 INTERNAL VALIDATION

Internal validation seeks convergence of research findings among three major aspects of the work namely; literature, questionnaire development, analysis of questionnaire and academic validity. The details are as follow:

8.3.1. Convergence 1: Literature search, Questionnaire development and Analysis

8.3.1.1 Literature search and questionnaire development

Validation of the questionnaire development is reflected in the convergence with the literature search and the theoretical framework adopted (chapter four). The constructs for operationalising the variables are supported by the well-acclaimed organisational psychology theory of job performance (e.g. Borman and Motowidlo, 1993; Conway, 1999) and Pinto and Slevin's (1988) project success model. Thus, the predictor variables had reasonably theoretical bases for them to be included in the questionnaire. The design and wording of the operational measures were informed by extensive literature review of common behavioural skills used in the construction and the human resource management genre (e.g. Dainty et al, 2003; Johnson et al, 2002).

8.3.1.2 Literature and Questionnaire analysis

Three sets of analyses were undertaken in respect of the data elicited, namely; the one-sample t-test, factor analysis and regression analysis. Convergence of the findings from the literature and these analyses were identified. That is, the findings from all three analyses were found to replicate the literature. The details are as follows:

T-test and Factor analysis

One-sample t-test and factor analysis were used to identify the constructs of the success criteria for MHBPs. Factor analysis revealed four underlying clusters namely *environmental impact*, *customer satisfaction*, *quality* and *cost-time criteria* and these converged with a number of literature relating to MHBPs. (e.g. Toole 1997; Torbica and Stroh; Ngowi, 2001). For instance, Ngowi (2001), Morrel et al (2001) and Poon et al (2004) have all recently highlighted the *environmental* criterion. Whilst Ngowi (2001) focused on using environmentally-friendly building processes to help address the environmental crisis resulting from MHBPs, Morrel et al (2001) concentrated on how local materials can effectively be managed to drastically reduce environmental waste. Similarly, Poon et al (2004) addressed issues relating to waste management arising out of the use of building materials on housing projects. Other researchers such as Ukoha and Beamish, (1999), Rukuro and Olima (2003) and Torbica and Stroh (2001) have all addressed critical issues relating to *customer satisfaction* in recent times. Equally, *quality* is also relatively well addressed

(Anderson, 1994; Ozoy et al, 1996; Torbica and Stroh, 2001; Mehta and Bridewell, 2006). The analysis conforms to empirical evidence that *quality* significantly predicts overall homebuyer satisfaction (Torbica and Stroh, 2001). The *cost- time* criteria have also been the subject of extreme research for the last 30 years (see Odenyika and Yusif, 1997; OKuwugo 1998), and still continues to receive considerable attention (e.g. Tam et al, 2002; Mhadi, 2004).

Multiple regression analysis

Here, the convergence is discussed in relation to the independent variables identified in the model. Subsequently, the variables are discussed under the various constructs under which they were represented in the conceptual model, namely; *job knowledge, job dedication and interpersonal facilitation*.

Task performance behaviours (Job Knowledge)

The variables identified under this construct were *site layout techniques for repetitive construction works* and *technology transfer for repetitive construction works* and, their convergence was discussed extensively in sections 7.3.1 and 7.3.2. Some of the cited works that supported the findings are Enhassi et al, (1997) Elbeltagi et al, (2001) and Tam and Tong, (2003). Others works of significance are attributed to Pheng and Sui (1999), Ngowi (2001) and Sadeghpour et al (2006). These writers recognise that space on construction sites is as important as other resources including

money, time, material, labour and equipment. To conclude, Enhassi (1997) argued that site layout planning in MHBPs is not only critical but a necessity towards establishing an efficient site organization and making a decisive influence on the performance outcome.

Technology transfer has also been critically investigated in the literature (Carrilo, 1996; Toole, 1997; Yong et al, 2006; Ganessan and Kesley, 2006). Toole (1997) for instance emphasises the importance of *technology transfer* when investigating uncertainty and home builders' adoption of technological innovations. In particular, Toole (1997) found out that the adoption of innovation by property developers is significantly related to the engagement of an individual (e.g. the PM) with background knowledge in innovation related activities. That is, it is reasonable to argue that the PMs' knowledge in technology transfer influences adoption behaviour which is reflected in the implications of this finding. The works of Akubue (2002) and Mehta and Bridwell, (2005) are all notable in respect of the significance of technology transfer for MHBPs.

Contextual performance behaviours (Interpersonal facilitation/Job dedication)

The variables identified under contextual performance behaviours were related to the PMs' *job dedication, time management,*

conflict resolution techniques, ease of approachability and volunteering skills.

These variables have in recent times become the focus of construction management research (Crawford, 2005; Phen and Chuan, 2006). Phen and Chuan (2006) for instance note that there have been widespread research studies of personal managerial skills of PMs and how they affect the performance of a project. The importance of interpersonal relations, team spirit and collaboration has also become recurring themes in construction management research in recent times (Nicolini, 2002). El-Saaba (2001) also highlighted that human factors are important skills required by the PM. Recent behavioural studies undertaken in the construction industry such as those by Dullaimi and Langford (1999), Dainty et al, (2003; 2004; 2005), Cheng et al (2005) also significantly support the findings.

Conflict resolution has also witnessed relatively intense research interest in recent times (see for example Dershimier, 1993; Leung and Yu, 2001; Leung et al, 2005). Indeed Leung et al (2005) noted that the conflicts are bound to happen in construction because of its labour intensive nature. Dershimier (1993) also concurs that conflicts are bound to happen on construction sites and that what is important is for the PM to have the skills to deal with them effectively (see also Pinto and kharbanda, 1995).

The importance of time management, for instance, has also received some considerable attention. Ramo (2004) explains that a well managed “time” signifies the difference in managers either being efficient and effective, achieving higher productivity; enhanced job satisfaction; reduction of stress aiding forward planning and higher creativity or not. Fryer et al (2004) also draw attention to the fact that unlike other resources such as money and materials, “time” is finite and cannot be replaced, making it probably the most important resource (see also Seiwart, 1989).

It is also important to restate here that the *contextual-task behaviours* identified demonstrated convergence with the theoretical framework which has been discussed extensively in section 7.3.1

8.3.2 Convergence 2: Questionnaire analysis and academic validity

The findings of this research have been submitted to reputable international construction management peer reviewed journals. A total of 3 journal papers are currently under review. The journals targeted so far are the Journal of Construction Engineering and Management of the American Society of Civil Engineers (ASCE), International Journal of Project Management (IJPM). To buttress the academic validity, the papers focus on specific aspects of the findings of the research. For instance, the paper submitted to the ASCE focuses on the key aim of the research which is the

development of the model. As noted earlier in the introductory chapter this paper has recently been revised at the request of ASCE and the reviewers' comment suggests that the methodology (analysis) used satisfies academic validity (see Appendix 21). The IJPM papers addresses the theoretical framework adopted and systematic understanding of the potential success criteria of MHBPs in developing countries. The paper on the systematic criteria for MHBPs has also been accepted for publication subject to revision (Appendix 22)

A fourth paper is being prepared for the consumption of the GoG to help influence policy direction in PM training and education in Ghana. Furthermore, a summary of the report would be made in a format that would be useful to practitioners who wish to implement the findings. The dissemination of the research findings with regard to academic validity is ongoing with the intended papers aimed at focussing on specific and distinct aspects of the findings.

8.3.3 Academic validity and literature search

To demonstrate this convergence, it is convenient to consider the papers cited in the journal and conference papers that have been published and/or to be published out of the study (Table 8.9). This technique has successfully been used by many other researchers such as Proverbs (1998) and Xiao (2003).

Table 8.9: No. of references cited in paper published

No.	Authorship	Year	No. of references cited	Remarks
1	Ahadzie et al	2004	33	
2	Ahadzie et al	2005a	33	
3	Ahadzie et al	2005b	40	
4	Ahadzie et al	2005c	46	
5	Ahadzie et al	2006a	38	
6	Ahadzie et al	2006b	37	
7	Ahadzie et al	2006c	27	
10	Ahadzie et al	2007c	40	In press
(expected)				
11	Ahadzie et al	2007d	38	In press
12	Ahadzie et al	2007e	39	Under review
13	Ahadzie et al	2007d	40	Under review
Total:			479	
Mean			37	

The significance of the papers cited lies in their use in supporting the main findings presented. A major characteristic of all the papers cited is that the main findings of the research were supported by comprehensive literature. A total of 479 papers have been referenced. While some of the references cited are duplicated as a result of similarities in their focus, many are unique and specific to the papers in question and have been used to support the findings. The established mean shows that on average 37 references have been cited per paper. This does not include bibliographies that have also served as useful guides for shaping the focus of the research. The considerable volume of literature provides evidence of convergence between the literature search and academic validity. The full bibliography of these papers is listed at the end of this thesis.

8.4 SUMMARY

This penultimate chapter has addressed the validation of the model developed in this study. Both external and internal validations have been described. External validation was undertaken using the held back data and Stein's equation of adjusted R square. The findings suggest that the model reflects reasonable predictive fit and could therefore be generalised.

Internal validation was undertaken at three levels namely: convergence between literature and questionnaire analyses; convergence between questionnaire analysis and academic validity; convergence between academic validity and literature search. Throughout this process the concepts, methodology and the findings of the research have been found to be reasonably supported by the extensive use of literature in support of the study.

It is therefore contended that the developed model has the potential for subsequent development and use by practitioners. The next chapter therefore concludes the research by providing a summary of the works done, drawing the main conclusions arising from the study and and recommendations for future research and for future implementation in the construction of MHBPs.

CHAPTER NINE

CHAPTER NINE: CONCLUSIONS AND RECOMMENDATIONS

9.0 INTRODUCTION

Against the background that professionals in developing countries (such as Ghana) need to be proactive in employing performance measures for advancing effective HRM practices, this research has developed a model for predicting the performance of PMs in MHBPs in Ghana. Subsequently, the appropriate competency profiles for engendering improved performance of PMs in MHBPs in Ghana have been identified. The eight chapters presented so far have elucidated the literary, conceptual, methodological and substantive approaches for addressing the research agenda.

In this chapter, the research is brought to a close by summarising the issues addressed throughout the study. Readers are first reminded of some of the key definitions used in the study particularly with respect to the term project manager (PM). This is then followed by a recapitulation of the key research questions. Thereafter, a summary of how the key objectives were satisfied is elucidated followed by the main conclusions of the research. The thesis is brought to a close with recommendations for future research and future adoption of the findings in practice.

9.1 DEFINITION OF THE PROJECT MANAGER

In this thesis, it has been noted that the term PM albeit widely used in construction management practice is subject to debate amongst professionals and practitioners. Traditionally, the term is often used to describe persons/entities that monitor, oversee and/or provide broad supervision on projects, but Lock (1987) contends that it should be used for one who exercises total authority and also accepts full responsibility for the management of projects. It is noted that MHBPs are often speculative in the sense that, the acquisition of land, design of house-unit and construction are made without reference to any specific customer in mind, who might wish to take ownership of some part of the management process by, say, appointing its own design team. It is therefore common for the management of the design and construction (including facilities management) of the house-units to be the sole responsibility of a single organisation- the property developer. The practice therefore in the Ghanaian house building industry is for property developers to engage the key management personnel including the appointment of the PM as “in-house” throughout the inception to the completion/commissioning of these projects. Therefore, within this research context, the PM is defined as an individual who operates in the interest of the property developer and has the authority and responsibility for the management of MHBPs from inception to completion.

9.2 RESEARCH QUESTIONS

In undertaking this research three main questions were posed, namely:

- What should be the appropriate framework for isolating the PMs' performance domain in MHBPs in developing countries such as Ghana?
- Given that the skills required by PMs are likely to develop and change as MHBPs develop through the project lifecycle, how should these be factored into the performance framework?
- In recognition of the unique (e.g. weak economic, technological and structural systems) and relatively difficult project environment (e.g. lack of economic and purposive rationality) prevailing in developing countries such as Ghana, what performance profiles are appropriate for engendering the professional development of PMs throughout the lifecycle of MHBPs?

9.3 REVIEW OF OBJECTIVES

The main aim of this research, as noted earlier, was to develop a model for predicting the performance of PMs in MHBPs in Ghana. Subsequently a number of research objectives were developed in order to collectively satisfy this aim. Here, the research objectives are revisited to highlight the extent to which they were accomplished through the various phases of the research.

Objective 1: To undertake a critical review of recent developments in HRM practices, in particular, the performance of PMs towards developing a deeper understanding of their key performance measures.

Some important issues regarding the significance of performance measures were identified from the broader HRM literature including recent contributions in construction management publications. While performance measures were described as an important contributor to improving HRM practices, it was established that this is yet to be adequately reflected in construction project management practice in developing countries. In particular, the literature revealed that while some attempts have been made towards human resource development (HRD) in the construction industry in developing countries, the focus of most of these studies have centred on improving craftsmen productivity. The review was therefore helpful in underpinning the view that there was indeed a dearth of research towards improving HRM practices in project-based sectors of the

construction industry in developing countries and thus provided reasonable justification for the need of the research.

Objective 2: To undertake a critical review of literature on project management in developing countries towards identifying the contribution of PMs in achieving project success.

This second objective was satisfied by undertaking an extensive review of recent developments in project management in developing countries. To this effect, project management practices in the Ghanaian construction industry were also discussed with particular reference to the contribution of PMs in MHBPs. The literature revealed that, very little has been done to help engender the personal skills of PMs in project-based sectors of the construction industry in developing countries. While there existed an acknowledgement of the contribution made by PMs in the construction industry of developing countries, a lack of detailed research on the performance of PMs in this context was also revealed.

Objective 3: To identify an appropriate theoretical framework for developing a conceptual model suitable for achieving the key research aim.

The literature review revealed a reliance on psychology - based theories and models for establishing frameworks useful in measuring the performance of PMs (chapter two). This third objective was therefore addressed by reviewing, in particular, the relevant literature on mainstream applied psychological literature. This led to the identification of the organisational psychology theory of job performance as an appropriate methodology for addressing this research agenda.

The organisational theory of job performance posits that a plausible but robust way of understanding the performance domain of managers is to distinguish *contextual performance behaviours* from *task performance behaviours*. *Task performance behaviours* being job specific behaviours and are associated with the PMs' "demonstratable" functions such as organising, programming planning, coordinating and controlling; and *contextual performance behaviours* being those discretionary job-related acts which contribute to organisational effectiveness but are not formally recognised as part of the job. *Contextual performance behaviours* are best predicted by drawing on the constructs of *interpersonal facilitation* and *job dedication* while *task performance behaviours* are best predicted by drawing on *cognitive ability*, *job knowledge*, *task proficiency* and *experience*.

Granted that behavioural competencies are also a function of the expected outcome of projects, it was also important to establish what constituted project success for MHBPs. Drawing on the project success criteria (and in particular Pinto and Slevin, 1988 success model), a project success framework for MHBPs was developed to represent another dimension of the theoretical framework. In addition, the project life cycle framework proposed by Lim and Mohammed (1999) was incorporated into the theoretical framework. This framework was adopted here as it offered the opportunity for a potentially more detailed conceptualisation of the PMs' performance dimension.

Objective 4: To develop a conceptual model for predicting the performance of PMs in MHBPs adopting the theoretical framework identified in objective 3.

Drawing from the organisational psychology theory of job performance and distinguishing *contextual performance behaviours* from *task performance behaviours*; a robust conceptual model was developed reflecting the conceptual, design, tender, procurement, construction and operational phases of the project lifecycle. The constructs identified from the *contextual-task* framework, namely; *cognitive ability*, *job knowledge*, *task proficiency* and *experience*, *interpersonal facilitation* and *job dedication* were incorporated into the various phases of the project lifecycle and represented the behavioural facet of the

performance of PMs in the conceptual model, and reflecting the context of MHBPs (see chapter, Figure 4.5).

Objective 5: To develop a robust research design to elicit the relevant data from experienced practitioners and professionals in the construction of MHBPs in Ghana

Bailey (1987) argues that the development of an appropriate conceptual model is key to identifying the relevant research methodology. The identification of an appropriate theoretical framework and development of the conceptual model paved the way towards fulfilling this objective. It was contended that, given that behaviours (as evidenced in the literature) are often stable and enduring over time, the operational measures involved can to a reasonable extent be assumed to be subjected to quantitative laws/logic. Subsequently (and in particular), in order to help establish the necessary convergence with similar studies on behavioural competencies, positivism was adopted as the underlying research paradigm that influenced the design of the research instrument. Therefore using the construct from the *contextual-task* framework and also drawing extensively on recent construction management literature, a broad range of behavioural measures were operationalised. These operational measures represented the independent variables of the model.

Contending that behavioural measures are complex and multidimensional (see chapter two), it was important to identify a large number of behavioural measures. This was necessary to make sure that all the possible potential variables had been accounted for. Acknowledging that in the management of MHBPs, PMs have to exhibit competencies in the management of repetitive techniques, it was considered reasonable to draw on this underlying concept of repetition towards understanding perceptions on success criteria in MHBPs. That is, based on the ideology that repetition is to draw on learning or experience curves to achieve, for instance, cost savings on house-units, this was interpreted to mean that there could be different cost targets to be met by property developers in respect with say the individual house-units and in the overall project cost.

Subsequently considering the key criteria cost for instance, the success criteria were categorised as cost on individual house-units and overall project cost respectively. Informed by the literature, overall project cost was defined as final-out-turn cost on overall project including for instance infrastructure such as road networks and street lighting (Table 4.1). Alternatively cost of individual house-units was defined as final out-turn relating to the specific house-unit. Similar reasoning was applied with regard to other key criteria such as quality, time, satisfaction and so on. In the end, 15 potential success criteria were identified to represent the dependent variables (see Conceptual model and also chapter five).

Based on these dependent and independent variables, a research instrument in the form of a self administered postal questionnaire was developed. The questionnaire was piloted in Ghana by drawing on the expertise of 10 experienced property developers. Suggestions made by the respondents were incorporated to improve the quality and suitability of the research instrument.

Objective 6: To employ appropriate analysis to help develop the substantive model for predicting the performance of PMs in MHBPs.

In fulfilling this objective, multiple regression analysis was employed in developing the model as designated in chapter seven. Multiple regression was chosen as against other alternative methods such as discriminant analysis and artificial neural network because of, in particular, its explanatory characteristics, which was a most desired function of this research. The regression technique included maximizing the R squared value (i.e. the coefficient of determination), and including only variables that had been proven to be statistically significant through stepwise regression, ANOVA, the Durbin-Watson test, multicollinearity diagnostics, and residual analysis.

Prior to undertaking the regression analysis, scale ranking and factor analysis were undertaken on the success criteria identified.

The scale ranking (using one-sample t-test) revealed some interesting hierarchies in the way property developers perceive the importance of the 15 success criteria identified (Table 6.9). It was noted that the hierarchies revealed could assist both property developers and PMs to come to agreement on how to appropriately channel resources towards achieving project success in MHBPs. Thereafter, it was necessary to convert the 15 dependent variables to a single dependent variable. This was achieved using factor analysis as explained in chapter six. The factor analysis was useful in establishing which of the variables could be measuring the same underlying effect. Above all, the findings obtained emerged reasonably convincing and supported by the literature (see for instance Odusami, 2003).

Objective 7: To test, refine and validate the model towards establishing its predictive accuracy and the potential relevance of its intended application

This objective was fulfilled by employing external and internal validation procedures. External validation involved the computation of the mean absolute percentage error of the residuals and the adjusted R^2 using Stein's equation as reported in chapter eight. Both computations revealed that the predictive accuracy of the model was robust and thus could be generalised. As part of the external validation a consensus of expert opinion was also sought from the field incorporating experienced

professionals and practitioners in Ghana to help gauge the potential relevance of the intended application of the model.

Internal validation involved triangulation of convergence among different sources of information comprising the literature search and analyses of the questionnaire. Academic validation was established through publication of the research findings at major international conferences and reputable construction management journals. The convergence of the three sources of information provides evidence of the validity of the findings.

Objective 8: To disseminate broadly the research findings for the benefit of industry and academia.

This final objective relating to dissemination was an ongoing process throughout the research process. The literature review and development of the conceptual framework were reported at various international conferences. Additionally, the findings emanating from the data analysis are soon to be published in two international construction management journals. A technical report, which includes a summary of the main findings, has also been prepared for the Government of Ghana to help influence policy direction in the future education and training of PMs in Ghana. It is expected the findings would be published in a format that practitioners, by and large may use in practice to enhance their performance in the implementation and management of MHBPs.

9.4 CONCLUSIONS

The main conclusions are summarised as follows:

- The determinants of project success in MHBPs as perceived by property developers in Ghana can be defined as constituting environmental-safety, customer satisfaction, quality and cost-time criteria.
- The best predictors of PMs' performance in MHBPs are: *job knowledge in site layout techniques for repetitive construction works; dedication in helping works contractors achieve works schedule; job knowledge of appropriate technology transfer for repetitive construction works; effective time management practices on house-units; ability to provide solutions to conflicts while maintaining good relationships; ease with which works contractors are able to approach the PM; and volunteering to help works contractors solve personal problems.* These variables

explained approximately 74% of the variance in the PMs managerial performance. PMs who want improve their managerial performance on MHBP should aspire to improve their knowledge and skills in theses competencies.

- It is noted that from the empirical findings of this study that aspects of *task performance behaviours*, (52%) and *contextual performance behaviours* (24%) determine the performance of PMs.
- Based on the validation exercise, predictive accuracy suggests that the findings could be generalised with respect to the PMs' performance in MHBP in the Ghanaian context.
- Based on a consensus reached by "experts" namely, convenience sampling of PMs, MDs and construction academicians on the potential relevance of the model in the Ghanaian house building sector, there was an indication that the intended application of the model is in congruence with reality and could serve a useful purpose if it were to be applied in practice.

9.5 CONTRIBUTION TO KNOWLEDGE

An original contribution to knowledge is an important concern in any doctoral research (Walker, 1997). The problem is that the

concept of originality could be arbitrary (Fellows and Liu, 2003; Sutrina, 2004). Walker (1997) has documented various ways to demonstrate originality such as development of new methodologies, tools and/or techniques, new areas of research, new interpretation of existing material, new application of existing theories to new areas or a new blend of ideas. Drawing on this background the contribution to knowledge of this research could be viewed in respect of its immediate contribution and what potential it may have in the future if further work is carried out.

Presently, managerial competencies are becoming increasingly important issues in a variety of settings including education, organisations and practitioner groups (Lyon, 2004). Information, advice and guidance about learning and training have also been seen as highly relevant to the professional development of HRM personnel (Gibb, 2003). However, identifying and developing appropriate measures for project-based sectors of the construction industry in developing countries is yet to be explored.

Identification of these competency profiles therefore provides an important guideline to both aspiring and experienced PMs on what property developers expect of them in terms of their managerial skills in MHBPs. Subsequently, these findings may help PMs who lack the relevant skills to strive to acquire the relevant training as part of their professional development. PMs who already possess the relevant skills may also appreciate the findings as it may

provide a knowledge-based impetus for achieving higher performance. The findings also provide a basis on which property developers in the Ghanaian house building industry seeking to recruit, monitor, retain and promote PMs, can make informed and objective decisions towards engaging those with the appropriate skills and competencies.

Thus, a contribution to knowledge from the findings reported in the thesis is the identification of competency profiles that can be mapped and/or customised towards improving work place learning and/or training requirements of PMs and subsequently towards the organisational development of property developers in Ghana. Property developers and PMs in many other developing countries can also benefit from the findings especially those in sub-Saharan African countries where the managerial challenges facing homebuilders are likely to be similar.

The body of knowledge in predicting the performance of PMs based on behavioural competencies in project-based sectors of developing countries is relatively unexplored. Subsequently, PMs who want to improve upon their own personal performance have up until now had to rely on their conviction on uninformed and largely subjective evidence. Thus, the developed model serves as an important knowledge base for replicating and advancing the performance of PMs in the Ghanaian construction industry and

perhaps the construction industry of many other developing countries.

The adoption of the organisational theory of job performance, while widely used in mainstream HRM research has not previously been explored in regard to the performance of construction project managers (CPMs). Furthermore, the concept of linking the PMs' performance measures to the project lifecycle is also a novel contribution in construction management research. That is, while other models exist that purport to link success to the project lifecycle, this attempt at explicitly focussing the relation of the PMs' performance to the project lifecycle adds significantly to the knowledge base of construction management research. The conceptual model could therefore be adopted across other geographical and project-based sectors towards identifying and developing appropriate competency profiles in the wider construction industry.

9.6 LIMITATIONS OF THE FINDINGS

As with all survey based research there are bound to be limitations, which need to be acknowledged. Readers are therefore reminded of the potential effect of sampling, unsystematic (i.e. random) and measurement errors and their likely impact on the data collected, analysis undertaken and the conclusions drawn. These notwithstanding, the demographic profile of the

respondents suggest that they have reasonable and direct professional experience in the implementation of MHBPs which should accord some reasonable credibility to the quality of responses received.

It is also important to acknowledge the relatively small sample size used for the study. However, this should not nullify the conclusions drawn, given that the relevant preliminary tests associated with the adequacy of sample size (including the assumptions of central limit theorem) proved favorable for the analysis to proceed. Furthermore, the margin of error associated with the study only marginally increased from 10 to 13% (see chapter five). That is, the predictive power of the model at 95% confidence level can be tolerated at a confidence interval of $\pm 13\%$, which appears reasonably good for a stochastic study of this nature (see for instance Walliman, 2000). Cross validation of the model suggested it has reasonable predictive power and could therefore be generalised at least in the Ghanaian context.

While emphasising the significance of model in reflecting the project lifecycle, it is important to remind readers that development of the substantive model focussed on the “construction phase”. This is largely due to resource constraints placed on the study. However, the successful completion of the developed model for the construction phase provides an important stepping stone for further research as indicated in the following.

9.8 RECOMMENDATIONS FOR FURTHER RESEARCH

Competency-based measures are increasingly being recognised as a viable option for engendering the managerial excellence of PMs. The *contextual-task* framework was used in developing a conceptual model that reflected the various phases of the project lifecycle in MHBPs. The successful development of the model for the “construction phase” suggests that there is the potential for the subsequent development of the competency profiles for the other phases of the project lifecycle. The conceptual model could therefore form the basis for future research towards the development and understanding of a holistic profile of PMs throughout the whole lifecycle of MHBPs.

It has been contested elsewhere that *job dedication* is normally redundant and should not be treated separately from *interpersonal facilitation* (section 7.3.1). In this study, aspects of *job dedication* accounted for more than half of the contribution of *contextual performance behaviours* affirming Conway’s (1999) assertion that in managerial performance, *job dedication* is very relevant and should be studied independently from *interpersonal facilitation*. This significant contribution might therefore be used as a basis for future research towards understanding fully its impact on MHBPs especially given that these projects are inherently much more difficult to manage than many one-off

projects (see for instance Mahdi, 2004). In many developing countries, economic and purposive rationality do not exist as a result of the weak socio-economic structure prevailing (Murithi and Crawford, 2004), and this has the potential of influencing the organisational allegiance and commitment of PMs towards concentrating fully on achieving organisational goals. This investigation could therefore provide the basis for understanding how PMs are able to maintain their *job dedication* on MHBPs in the face of these difficulties.

It is recognised that the competency profiles identified do not operate in a vacuum and would be influenced, in particular, by situational and environmental factors. There is therefore the research opportunity to identify the key determinants that affect each of the competency profiles identified. This will help both stakeholders and the PMs to identify the important variables that militate against the effective implementation of the appropriate knowledge and skills. Subsequently, the significant variables that are controllable could then be properly managed to help engender superior performance levels. Potentially, identification of these factors will enable the appropriate allocation of the limited resources available towards engendering the professional development of PMs in MHBPs.

9.9 RECOMMENDATIONS FOR INDUSTRY

As noted throughout the thesis, competency programmes are helpful for developing and matching the skills of HRM personnel to the core organisational strategies. The competency profiles identified here offers PMs in the Ghanaian house building industry the opportunity to have a clearer idea of what property developers expect of them in relation to their competencies. The findings can therefore be used as a rating system (either in terms for instance 360 degrees evaluation or self-evaluation) so that PMs can review and appraise their performance levels towards identifying current and/or projected skills deficiencies; proving their value; gaining recognition of their professional expertise towards best practice improvement.

It also recommended that property developers seeking to recruit, monitor, retain and promote the services of PMs could use the findings to make informed and objective decisions towards engaging those with appropriate skills and competencies.

As already noted by Mirable (1997), competency models are the first step in developing job-specific profiles and in rating an employee's level of competency against a set of validated measures. Competency profiles have also become an important recourse in a variety of settings including education, business

management and other HRM activities. Interestingly, while project management practice is gradually gaining popularity in the construction industry in Ghana, it is also evident that appropriate systems for sustaining the career and professional development of PMs is lacking. In particular, there is a lack of appropriate professional institutions to help unify the activities of PMs and also govern their professional examination, certification and accreditation practices.

Here the view is that, the findings of this research could be used by professionals as a reflective document for initiating the establishment of a Ghanaian Association of Projects Managers (GAPROM), and the competency profiles identified herein could be further developed to form baseline competencies in PMs' performance, for gaining recognition and value in their performance and for benchmarking and best practices (see also section 7.3.2 on recommended application of model).

Thus, given the strategic position of MHBPs in the context of this study both in terms of scope and potential advancement for improved HRM practices, this finding (inter alia) could therefore be used as a foundation for developing an appropriate body knowledge that PMs could use to identify their professional and development needs and also collectively used by a professional body such as the GAPROM (proposed here) to ascertain the key managerial competencies.

With the support provided by the Government of Ghana for the research and the reasonable interest shown by the property developers (i.e. the GREDA) in participating in the survey, it should be possible for the key stakeholders including PMs in the housing industry in Ghana to pool resources together towards establishing a framework for the development of the GAPROM and the associated body of knowledge.

9.9 SUMMARY

This chapter has provided a review of the original research objectives and the extent to which they were achieved. The main conclusions have been presented and the limitations of the research have been acknowledged. Recommendations for further research and for practicing PMs and property developers have been proposed.

In summary the research has developed a competency-based model representing a robust mechanism for predicting the performance of PMs. The model could be used by property developers to recruit, retain and develop their PMs. PMs could also adopt the model for their own personal development in helping to identify strengths and weaknesses. It is contended that the developed model has the potential for improving the

performance of PMs in developing countries such as Ghana, when used as part of a wider sphere of HRM practices and procedures.

REFERENCES

REFERENCES

- Abassi, Y. G. and Al -Mharmah (2000) Project management practice by the public sector in a developing country, *International Journal of Project Management*, Vol. 18, pp. 105-109.
- Abraham, S. E., Karns, L.A., Shaw, K. and Mena, M. M. (2001) Managerial competencies and the managerial performance appraisal process, *Journal of Management Development*, Vol. 20 (10), pp. 842-852.
- Adnane B. (1998) Effects of human resource management on project effectiveness and success; toward a new conceptual framework, *International Journal of Project Management*, Vol.16 (1), pp. 21-26.
- Ahadzie, D.K., Proverbs, D. G. and Olomolaiye, P. (2004) Meeting Housing Delivery Targets in Developing Countries: The project managers contribution in Ghana, In Ogunlana et al (Eds): *The Construction Industry in Developing Countries, International Conference on Globalization and Construction*, Asian Institute

of Technology (AIT), Bangkok, Thailand, 17-19 November, pp. 620-630.

Ahadzie, D.K., Proverbs, D.G. and Olomolaiye P. (2005a) Construction Performance measurement systems: emerging research needs, *5th International Postgraduate Research Conference*, University of Salford, 14-15th April, pp. 736-746.

Ahadzie, D.K., Proverbs, D.G. and Olomolaiye P. (2005b), Project management performance measures: a fresh perspective, *21st ARCOM Conference*, Vol.1, SOAS, London, pp. 3-12.

Ahadzie, D.K., Proverbs, D.G. and Olomolaiye, P. (2005c) Towards measuring the performance of project managers: some methodological challenges. *1st International Conference on Complexity and the Built Environment*, University of Liverpool, pp. 181-190.

Ahadzie, D.K., Proverbs, D.G., Olomolaiye, P (2006c) Development of Research Instrument for Project Managers Performance Measures in Mass House Building Projects:, *22nd ARCOM Conference*, University of Central England, September, 4-7, pp. 165-175.

Ahadzie, D.K., Proverbs, D.G., Olomolaiye, P. (2006b) Redefining performance measurement systems: a multidimensional concept, *International Conference in the Built Environment in*

the 21st Century, Universiti Teknongi Mara, Malaysia June 13-15th, pp. 785-795

Ahadzie, D.K., Proverbs, D.G., Olomolaiye, P. (2007a) Critical success criteria for Mass House Building Projects in Developing Countries, *International Journal of Project Management* (in press) doc:10.1016/j.ijproman.2007.09.06

Ahadzie, D.K., Proverbs, D.G., Olomolaiye, P. (2007b) A model for predicting the performance of project managers in mass house building projects at the construction phase, *Journal of Construction Engineering and Management, ASCE*, (Accepted subject to revision)

Ahadzie, D.K., Proverbs, D.G., Olomolaiye, P. (2007c) Towards developing competency-based measures for construction project managers: should contextual behaviours be distinguished from task behaviours? *International Journal of Project Management* (In press), doc:10.1016/j.ijproman.2007.09.011

Ahadzie, D.K., Proverbs, D.G., Olomolaiye, P. and Gameson, R. (2006) A conceptual predictive model for evaluating the performance of project managers in MHBPs, In (Eds Baldwin et al), BEAR 2006 – *Construction Sustainability and Innovation/CIB W 89 International Conference on Building*

Education and Research, Hong Kong, April 12p. (ISBN: 962-367-511-9).

Akintoye, A. and Skitmore, M. (1991) Profitability of UK Construction Contractors, *Construction Management and Economics*, Vol. 9, pp. 311-325.

Akubue, A. (2002) Technology transfer: a third world perspective, *The Journal of Technology*, Vol. 28 (1), pp. 14-24

AL-Momani, A.H. (2000) Structuring information on residential building: a model of preference, *Engineering, Construction and Architectural Management*, Vol. 7 (2), pp 179- 190.

Amoa- Mensah, K. (1999) Attaining affordability through cost saving house building techniques: a case study of strategies that aided resource optimization in some affordable housing projects in Ghana, *The Surveyor, Ghana Institution of Surveyors*, pp. 109- 122.

Amoa- Mensah, K. (2002) The strategy of fast track housing delivery: the Ashongman success story, *Paper presented at the Building and Road Research Institute, Research Week Seminar*, November, pp 1-7

Amoa –Mensah, K. (2003) Housing in Ghana: a search for sustainable options as the way forward for enhanced output – year 2003 and beyond, *A paper presented at the International Building Exhibition Seminar*. Accra, 27th –29th August.

Amstrong, M (2003) A handbook of human resource management practice, Kogan, London.

Anderson, E.W.C. and Lehman, D.R. (1994) Customer-Satisfaction, Market Share and Profitability, Findings from Sweden, *Journal of Marketing*, Vol. 58, pp. 53-66

Anokye, A (2003) An investigation into the activities of GREDA members in housing delivery in Ghana, BSc Disseration, Dept of Building Technology, Kwame Nkrumah University of Science and Technology, Kumasi

Antwi, A. (2000) Urban Land Markets in sub-Saharan African Country: A Quantitative Study of Accra, Ghana, PhD Thesis, Napier University, Department of Econimcs

Argle, M. (1994) The Psychology of Interpersonal Behaviour, 5th Edition, Penguin, London

Ashley, D.B. (1980) Simulation of Repetitive –Unit Construction, *Journal of Construction Division, Proceedings of ASCE*, Vol. 106 (Co2), pp. 185-198

Ashley, K.M.A. (2003) Housing delivery in Ghana: the perspective of the real estate developer, Unpublished BSc Dissertation, Department of Building Technology, Kwame Nkrumah University of Science and Technology. Kumasi.

Ashton, M.C. (1998) Personality and Job Performance, The Importance of Narrow Traits, *Journal of Organizational Behaviour*, Vol. 19, pp. 289-303.

Ashton, M.C., Jackson, D.N., Paunonen, S.V. H. and Rothstein, M.G. (1995) The Criterion Validity of Broad Factor Scales Versus Specific Facet Scales, *Journal of Research in Personality*, Vol. 29 pp. 423-442.

Association of Project management (2000) Body of Knowledge, APM 4 point for professional development, UK.

Austin, J.T., and Villanova, P. (1992) The Criterion Problem: 1917-1992, *Journal of Applied Psychology*, Vol. 77 (6), pp. 836-874.

Ayirebi-Dansoh, K. (2005) Strategic planning practice of construction firms in Ghana, *Construction Management & Economics*, Vol. 23, pp.163-148.

- Ayisi, P. (2000) Constructors cost control system in Ghana, MSc
Dissertation, Dept. of Building Technology, Kwame Nkrumah
University of Science and Technology, Kumasi
- Baccarini, D. (1999) The logical framework method for defining
project success, *Project Management Journal*, Vol.30 (4), pp.
25-32.
- Bailey P.J. (2005). The communication of colour digital visual
simulation: do architects and clients observe the same colour
structures, Phd thesis, University of Wolverhampton
- Bailey, D.K. (1987) *Methods of Social Research*, Conlier Macmillan
Publishers, London
- Baker, B.N., Murphy, D.C., and Fisher, D. Factors affecting project
success: In Cleland and King (eds.) *Project Management
Handbook*, New York, Van Nostrand Reinhold, pp. 669-685.
- Banini, C.Y. (1983) An appraisal of the activities of the professional
institutions associated in varying degrees with the construction
industry in Ghana, BSc Dissertation (Unpublished), Dept. of
Building Technology, KNUST. Kumasi
- Bank of Ghana (2006), *Financial report for the fiscal year 2005*,
Accra, Ghana

- Barbie, E.R (2006) Survey research methods, Belmont, Wadsworth, Publishing Company, California
- Bassioni, H.A., Price, A.D.F., and Hassan, T. M. (2004) Performance Measurement in Construction, *Journal of Management in Engineering*, ASCE, Vol. 20 (2), 42-50.
- Bechtoldt, H. (1947) Problems in establishing criterion measures, In: Stuit, D.D (eds.), *Personnel research and test development in the Bureau of Naval Personnel* (pp. 357-379). Princeton, NJ, Princeton, University
- Bell J. (1996) Doing your own research project: a guide for first time reseachers in education and social science, Bristol, Open University Press
- Belout, G. and Gauvreau, C. (2004) Factors influencing project success: the impact of human resource management, *International Journal of Project Management*, Vol. 22, pp. 1-11.
- Birmingham, W., Neustadt, I. and Omaboe, E. (1966) A study of contemporary Ghana: the economy of Ghana, George Allen and Unwin Ltd, London

Bititchi, U.M., Carrie, A.S. and McDevitt, L. (1997) Integrated performance measurement systems: an audit and development guide. *The TQM Magazine*, Vol. 9 (1), pp. 46-53.

Blaikie, N. (2003) *Analyzing Quantitative Data*, SAGE Publications, UK

Borman W.C. (1978) Exploring Upper Limits of Reliability and Validity in Job Performance Ratings, *Journal of Applied Psychology*, Vol. 63 (2), pp. 135-144.

Borman, W.C. & Brush, D. H. (1993), More Progress Towards Taxonomy of Managerial Performance Requirements, *Human Performance*, Vol. 6(1), pp. 1-21.

Borman, W.C. and Motowidlo, S.J. (1993) Expanding the Criteria Domain to Include the Elements of Contextual Performance, In: Schmitt and Borman (Eds.) *Personnel Selection in Organizations*, San – Francisco, pp 71-98.

Borman, W.C. and Motowidlo, S.T. (1997) Task performance and contextual performance: the meaning for personnel selection research, *Human Performance* Vol.10 (2), pp. 99-109.

Borman, W.C., Dorsey, D.W. and White, L. A. (1995) Effects of Ratee Task Performance and Interpersonal Factors on

Supervisory and Peer Performance Ratings, *Journal of Applied Psychology*, Vol. 80 (1), 168-177.

Boyatzis, R (1997) Management: a sociological introduction, *Human Relations*, Vol. 50 (4), pp. 461-467

Brace, N., Kemp, R. and Snelgar, R. (2003) SPSS for Psychologists. A Guide to Data Analysis Using SPSS for Windows

Brinberg, D. and McGrath, J. E. (1985), *Validity and the Research Process*, CRC press, London

Brinberg, G. H. (1999) *Project management for Building Designers and Owners* CRC press, London

Brophy, M. and Kiely, T. (2002) Competencies: a new sector, *Journal of European Industrial Training*, Vol. 26 (2/3/4), pp. 165-176.

Brown, A., & Adams, J. (2000) Measuring the effect of project management on construction outputs: a new approach, *International Journal of project management*, Vol.18, pp 327-335.

Browne, M.V. (1975) A Comparison of a Single and Cross-Validation Methods for Estimating the Square Error of

Prediction in Multiple Linear Regression, *British Journal of Maths and Statistical Psychology*, Vol. 28, pp. 122-120.

Burgess, R.A. and White, G. (1979) Building Production and Project Management, Longman, London

Burgyone, J. (1989) Creating the managerial portfolio: building on competency approaches to management development. *Management, Education and Development*, Vol. 20 (1), pp. 56-61.

Campbell, J.P., Gasser. M.B. and Oswald, F.L. (1996) The substantive nature of job performance variability. In (Murphy, (ed), *Individual differences and behaviour in organisation*, San Francisco: Jossey;Bass, pp. 258-299.

Campbell, J.P., McCloy, R. A., Opler, S.H and Sager, C.E (1993) A theory of performance, In Schimdt and Borman (eds) *Personnel selection in organisations*, San-Francisco:Bass, pp. 35-70.

Cantor, N. and Mischel, W. (1979) Prototypes in Person Perceptions: In BerKowitz, L (ed) *Advances in Experimental Social Psychology*, Vol. 12, pp 3-52, New York Academic Press

Carrillo, P (1994) Technology transfer: a survey of international construction companies, *Construction Management and Economics*, Vol. 12 (1), pp. 45-55

Chan, D.W.M. and Kumaraswamy, M.M. (1999) Forecasting construction durations for public housing projects: a Hong Kong perspective, *Building and Environment*, Vol. 34, pp. 633-646.

Cheng, M.I., Dainty A.R.J. and Moore, D.R (2005) What makes a good project manager?, *Human Resource Management Journal*, Vol. 15 (1), pp. 25-37.

Cheng, M.I., Dainty A.R.J. and Moore, D.R. (2003) The differing faces of managerial competency in Britain and America, *Journal of Management Development*, Vol. 22 (6), pp. 527-537.

Chinyio E. (1999) An Investigation into the factors, influencing Constructive clients' projects' needs. Unpublished Phd thesis, University of Wolverhampton

CIOB (2002) Code of practice for project for construction and development, Blackwell publishing, United Kingdom

Clarke, A. (1999) A practical use of key success factors to improve the effectiveness of project management. *International Journal of Project Management*, Vol. 17 (3), pp. 139-145.

Cohen J. (1992) Statistical power analysis, *Curr.Dir psychological Sci*, Vol. 1(3), pp. 98-107.

Conway, J. M (1996) Additional construct validity for task-contextual performance distinction, *Human Performance*, Vol. 9, pp. 309-329

Conway, J. M. (1999) Distinguishing Contextual Performance from Task Performance for Managerial Jobs, *Journal of Applied Psychology*, Vol.84 (1), pp 3-13.

Conway, J. M. (2000) Managerial Performance Development Constructs & Personalities Correlates, *Human Performance*, 13 (1), pp. 23-46.

Cooke -Davies, T. J. (2002) The real success factors on projects, *International Journal of Project Management*, Vol. 20, pp. 185-190.

Cowling A and Mailer (1990) Managing human resources, London, Edward Arnold

Cox, F.R., Issa, R.R.A Ahrens, D. (2003) Perceptions of Management on Key Performance Indicators for Construction, *Journal of Construction Engineering and Management*, ASCE, Vol. 129 (2), pp. 142-151.

Crawford, L. (2005) Senior management perceptions of project management competence, *International Journal of Project Management*, Vol. 23, pp. 7-16.

Crawford, L., Pollack, J. and England, D. (2006) Uncovering the Trend in Project Management: Journal Emphases Over the last 10 Year, *International Journal of Project Management*, Vol. 24, pp. 175-184.

Croft C. (1996) Time management, International Thomson and Publishing Company, London

Dainty A.R.J Cheng, Mei-I and Moore, D. R. (2005) Competency-Based Model for Predicting Construction Project Managers' Performance, *Journal of Engineering in Management*, ASCE, Vol. 21 (1), pp. 2-9.

Dainty, A.R.J., Mei-I Cheng and Moore, D.R. (2004) A competency-based performance model for construction project managers, *Construction Management and Economics*, Vol. 22, pp. 877-886.

- Dainty, A.R.N, Cheng Mei-I and Moore, D.R. (2003) Redefining performance measures for construction project managers: an empirical evaluation. *Construction management and Economics*, Vol. 21, pp. 209 –218.
- de Wit, A. (1988) Measurement of project management success. *International Journal of Project Management*, Vol. 6 (3), pp. 164-170.
- DeNisi A.S., Cafferty, T. P. and Meglino, B. M. (1984) A cognitive view of the performance appraisal process: a model and research propositions, *Organizational Behaviour and Human Performance*, Vol. 33, pp360-396.
- Denscombe, M (2003) *The Good Research Guide*, Open University Press
- Dershimer, G. (1993) Finding Your Way Through Conflict, *Journal of Management in Engineering*, Vol. 9 (2), pp. 142-147.
- Dhanasekor, M.. (2000) Identification of optimal size resource for a repetitive housing, *Construction, Engineering, Construction and Architectural Management*, Vol.7 (4), pp. 347-361.
- Diallo, A. and Thuillier, D. (2004) The Success dimension of international development projects: the perceptions of African

project coordinators, *International Journal of Project Management*, Vol. 20, pp. 19-31.

Dissnayaka, S.M. and Kumaraswamy, M. M. (1999) Comparing Contributors to Time and Cost Performance in Building Projects, *Building and Environment*, Vol. 34, pp. 31-42.

Dulaimi, M.F and Langford, D (1997) Job behaviour of construction project managers: determination and assessment, *Journal of Construction Engineering and Management*, ASCE, Vol. 125 (4), pp. 256-264.

Eaterby – Smith M., Thorpe R and Lowe A (2002) Management research: an introduction, Page Publication, London.

Edmonds, G.A. and Miles, D.W.J. (1984) Foundations for Change: Aspects of the construction industry in developing countries, Intermediate Technology Publications, London.

Edum –Fotwe, F. and McCaffer, R. (2000) Developing project management competency: perspectives from the construction industry. *International Journal of Project management*, Vol.18, pp. 111- 124.

Egbu, C.O. (1999) Skills, Knowledge and competencies for managing construction refurbishment works, *Construction Management and Economics*, Vol. 17, pp 29-43

- El- Saaba, S. (2001) The Skills and Career Path of an Effective Project Manager, *International Journal of Project Management*, Vol. 19, pp1-7
- Elbetagi E., Hegazy T., Honsy, A. H. and Eldosouky, S. (2001) Schedule-Dependent Evolution of Site Layout, *Construction Management and Economics*, Vol. 19, pp. 689-697.
- EL-Rayes K., Ramnathan, R. and Moselhi, O. (2000) An object-oriented model for planning and control of housing construction, *Construction Management and Economics*, Vol. 20, pp 201-210.
- English, H. B. & English, A.C. (1958) A comprehensive dictionary of psychology and psychoanalytic terms, *New York: Longmans, Green & Company*.
- Enhassi, A. (1997) Site organization and supervision in housing projects in the Gaza Strip, *International Journal of Project Management*, Vol. 15, No.2, pp. 93 -99.
- Environmental Protection Agency (1994) Environmental law, Act 1994, Ghana
- Fairlcough R (2005) Teaching note os ST 2204 Statistics Module, University of Wolverhampton (Unpublished)

Faniran, O. O., Love, P. E. D., and Smith, J. (2000) Effective Front – End Project Management – A key Element in Achieving Project Success in Developing Countries, *2nd International Conference on construction in Developing Countries: Challenges facing the construction industry in developing countries*, 15 –17 November, Gabarone, Botswana, (http://www.odsf.co.za/cdproc/2nd_proceedings.html, accessed, 31/03/04)

Faniran, O.O. (1999) The Role of Construction Project Planning in Improving Project Delivery in Developing Countries: Case study of the Nigerian construction industry. *Proceedings of the 1st Conference of CIB TG 29 on Construction in Developing Countries: Construction Industry Development in the Millennium*, Singapore, 27-29 October, (http://www.odsf.coza/cdcproc/1st_proceedings.html, accessed, 31/03/04)

Fellows and Liu (2003), Research Methods for Construction, Blackwells Ltd, UK.

Field, A (2000) Discovering Statistics using SPSS for Windows, Sagar Publication London.

Field, A. (2005) Discovering Statistics, Using SPSS for Windows, Sage Publications, London

Fontana, D. (1993) Managing Time, Personal and Professional Development, BPS Books

Ford, D. K. (2004) Development of a performance appraisal training programme for the rehabilitation institute of Chicago, *Journal Of European Industrial Training*, Vol. 28 (7), pp. 550-563.

Formoso, C.L., Tzotzopoulous, P and liedtke, R (2002) A model for managing the product development process in house building, *Engineering, Construction and architectural Management*, Vol. 9(5/6), pp. 419-432

Formoso, C.L., Tzotzopoulous, P and Liedtke, R (2000) A model for managing the product development process in house building, *Engineering, Construction and Architectural Management*, Vol 9(5/6), pp. 419-432

Fowler, S.W., King, A.W., March, S.J et al (2000) Beyond products: new Strategic imperatives for developing competencies in dynamic environments, *Journal of Engineering and Technology Management*, Vol. 17, 357-377.

- Fraser, C (1999) A non-results-based effectiveness index for construction site managers *Construction Management and Economics*, Vol. 17, pp. 789-798
- Fraser, C (2000) The influence of personal characteristics on effectiveness of construction site managers, *Construction Management and Economics*, Vol. 18, pp. 29-36
- Fraser, C. and Zarkada-Fraser, A. (2003) Investigating the effectiveness of managers through an analysis of stakeholder perceptions, *Journal of Management Development*, Vol. 22(9), pp. 726-783
- Fryer, B.G., Egbu, C. and Gorse (2004) *The Practice of Construction Management*, BSP Professionals, United Kingdom.
- Fulmer, R.M. Gibbs, P.A. and Goldsmith, M. (2000) Developing leaders: How winning Companies keep winning, *Sloan Management Review*, Vol. 42, pp.1-49
- Gale, A. and Brown, M (2003) Project management professional development: an industry led programme, *Journal of Management Development*, Vol. 22 (5), pp. 410-425
- Ganesan S. (1983) Housing and construction: major constraints and development measures, *Habitat International*, Vol. 7 (5/6), pp. 173-194, Pergamon press.

- Ganessan ,S. J. and Keseley, J. (2006) Technology transfer;
international collaboration in Sri Lanka, *Construction
Management and Economics*, Vol. 24 (7), pp. 743 - 753
- Ganessan, S. (1979) Growth of housing and construction Sectors:
key to employment creation, Pergamon, Oxford, pp.33-34,
- Garavan, T. N., Gunnigle, P. and Morley, M. (2000) Contemporary
HRD research: a triarchy of theoretical perspectives and their
presecrptions for HRD, *Journal of European Industrial
Training*, Vol. 24 (2/3/4), pp. 65-93
- Garavan, T. N., Gunnigle, P. and Morley, M. McGuire, D. (2002)
Human resource development and workplace learning:
emerging theoretical perspective and organisational practices,
Journal of European Industrial Training, Vol. 24 (2/3/4), pp.
60-71
- Gellatly I.R. and Irving R.G. (2001). "Personaltiy, automony and
contextual performance of managers." *Human Performance*,
Vol.14 (3), pp. 231-245.
- Gibb, S. (2003) Information, advice and guidance – is it time for a
National Research Forum, *Career Development International*,
Vol. 8 (4), pp. 169-218.

Glass G.V., Rekham, P.D and Sanders,J.R. (1972) Consequences of Failure to Meet Assumptions Underlying the Fixed Effects Analysis of Variance and Covariance, *Review of Educational Reseaerch*, Vol. 42, pp. 237-288.

Goh B.H. (1998) Forecesting residential construction demand in Singapore: a comparative study of the currency of time series, regression and artificial neural tecniques *Engineering, Construction & architecture Management*, Vol. 5/3, pp. 261-75.

Good, I. P. and Hardin, J.W. (2003) Common Errors in Statistics (and How to Avoid Them), John Wiley and Sons Inc, London.

Goodwin, R.S.C. (1993) Skills Required of Effective Project Managers, *Journal of Construction Engineering and Management*, ASCE Vol. 9 (3), 217-226.

Guadagnoli E. and Velicar, W. (1988) Relations of Sample Size to the Stability of Component Patterns, *Pyschological Bulletin*, Vol. 103, pp. 267-275.

Gummesson, E (1991) Qualitative methods in management research, revised edition, Sage Publications, London

Hair, J.F., Anderson, R.E., Tatham, R.L. and Black, W.C (1998) Multivariate data analysis, Upper Saddle River, Prentice Hall, New Jersey

- Hammond, F. N. (2006) The Economic Impact of Sub-Saharan Africa Urban Real Estate Policies, PhD Thesis, University of Wolverhampton.
- Harris, M. M. and Schaubroeck, J. (1988) A Meta- Analysis of Self-Supervisor, Self-peer and Peer-Supervisor Ratings, *Personnel Psychology*, Vol. 41, pp.43-61.
- Hartley, J. and Braithwaite A. (1989) The Applied Psychology Psychologists, Open University Press, Milton Keynes.
- Hartmann A. (2006) The Context of Innovation Management in Construction Firms, *Construction Management and Economics*, Vol. 24, pp. 567-578.
- Harris, M, M and Schaubroeck, J (1988) A Meta- Analysis of Self-Supervisor, Self-peer and Peer-Supervisor Ratings, *Personnel Psychology*, Vol. 41, pp43-61
- Hayes, J., Rose-Quire, A. and Allinson, C. W (2000) Senior managers' perceptions of the competencies they require for effective performance: implication for training and development, *Personnel Review*, Vol. 29 (1), pp. 92-105.

Heffman F. and Flood, P. (2000) An exploration of the Relationship between the adoption of Managerial Competencies, organisational characteristics, human resource Sophistication and Performance in Irish Organisations, *Journal of European Industrial Training*, Vol. 24, 2/3/4, pp.128-136.

Hinkle, E. D., Wiersma, W and Jars S.G. (1979) Applied Statistics for the Behavioural Sciences, Chicago.

Home Finance Company (2001) Housing finance in Ghana. Content Manager 1.0

Hopkins, K. P. and Glass G.V (1978) Basic Statistics for behavioural Sciences, Prentice-Hall Inc, New Jersey.

[http:// www.homefinance-gh.comhfc/Details.cfm?EmpiD=118](http://www.homefinance-gh.comhfc/Details.cfm?EmpiD=118)

(accessed 26th Feb. 2004)

Hua, G. B. (1996) Residential construction demand forecasting using economic indicators: a comparative study of artificial neural networks and multiple regression, *Construction Management and Economics*, Vol. 14, pp 25-34.

Huemann, M., Keegan, A. and Turner ,R. (2007) Human resource management in the project-oriented company: a review, *International Journal of Project Management*, Vol. 25, p. 315-323.

- Hunter, J (1983). A causal analysis of cognitive ability, job knowledge, job performance and supervisory ratings *In F Landy, S. Zedeck and Cleveland (Eds), Performance Measurement and Theory, Hillsdale, NJ: Erlbaum, pp.257-266*
- Hyari, K. and EL-Rayes, K. (2005) Optimal Planning and Scheduling for Repetitive Construction Projects, *Journal of Management in Engineering*, ASCE, Vol. 22 (1), pp. 11-19.
- Imbert I.D.C. (1990) Human Issues Affecting Construction in Developing Countries, *Construction Management and Economics*, Vol. 8, pp. 219-228.
- Jaing, J., Klein, G and Margulis, S. (1998) Important behavioural skills for project managers: the judgment of experienced information systems professionals, *Project Management Journal*, Vol. 29 (1), pp. 1-7.
- Jha, K.N. (2006) Attributes of a project coordinator, *Construction Management and Economics*, Vol., pp. 409-419
- Jha, K.N. and Chandrashekhar, K. (2006) What attributes should a project coordinator possess? *Construction Management and Economics*, Vol. 24 (9), pp. 977-988.

- Johnson, J.W., Schneider, R. J. and Oswald, F. D. (1997) Toward a Taxonomy of Managerial Performance Profiles, *Human Performance*, Vol. 10(3), pp. 227-250.
- Johnson, P. and Duberly. J. (2000) Understanding management research, Sage Publications, London.
- Jugdev, K (2004) Through the looking glass: examining theory development in project management with the resource-based view lens, *Project Management Journal*, Vol. 35 (3), pp. 25-36.
- Kaitilla, S. (1993) Satisfaction with public housing in Papua New Guinea: the case of West Taraka Housing scheme, *Environment and Behaviour*, Vol. 25, pp. 514-545.
- Kamaraswamy, M. M. and Thorpe, A. (1996) A Computerised Construction Project Management Evaluation System, *Advances in Engineering Software*, Vol. 25, pp.197-206.
- Kaming P.F. (1996) A Productivity Audit system For Productivity Management In Indonesia, PhD Thesis, University of Wolverhampton.
- Kaming P.F., Holt G.D., Kometa, S.T. and Olomolaiye, P.O. (1998) Severity diagnosis of productivity problems – a reliability analysis, *International Journal of Project Management* Vol. 16 (2), pp. 107-113.

- Kaming P.F., Holt G.D., Kometa, S.T. and Olomolaiye, P.O. (1998) Factors influencing craftsmen's productivity in Indonesia, *International Journal of Project Management* Vol. 15 (1), pp. 21-30.
- Kartam, N.A., Al-Daihani, T.G. and Al-Bahar, J.F. (2000) Professional project management practices in Kuwait: issues, difficulties and recommendations, *International Journal of Project Management*, Vol.18, pp.281-296.
- Katz, D. and Kahn, R. (1978) *The Social Psychology of Organisation*, 2nd Edition, John Wiley, New York.
- Kazaz, A. and Birgonul, J. (2005) The evidence of poor quality in high rise and medium rise housing units: a case study of mass housing projects in Turkey, *Building and Environment*, Vol. 40, pp. 1548-1556.
- Keivani, R. and Werna, E. (2001) Modes of Housing Provision in Developing Countries. *Progress in Planning*, Vol. 55, issue 2, February, pp 65 –118
- Keraminiyage, K.P., Amaratunga, R.D.G and Haigh, R.P (2005) A capability maturity approach for construction projects improvement: use of case studies approach, 5th Postgraduate

research conference, University of Salford, April 13th-15th, pp. 465-475

King N., Price A.D.F and Dainty A.R.J. (2004) Strategic Approaches to Managing Human Relations within Construction SMES, In: Khosrowshahi, F (Ed) *20th Annual ARCOM*, 1-3 September, Conference, Vol. 1 505-12.

Kirbert C.J. and Coble, R.J. (1995) Integrating Safety and Environmental Regulations of Construction Industry, *Journal of Construction Engineering and management*, ASCE, 121 (1) pp. 95-99.

Konadu- Agyemang (2001): A survey of housing conditions & characteristics in Accra, an African city. *Habitat International*, Vol. 25, pp 15-34.

Konig C., Buhner, M & Murlin G. (2005) Workshop Memory, Fluid Intelligence and Attention Are Predictors of Multitasking & Performance but polychronicity and Extraversion are not, *Human Performance* Vol. 18 (3), pp. 243-266.

Kouzes, J.M. and Posner, B.Z. (2002) The leadership practices inventory: theory and evidence behind the five practices of exemplary leaders.

(http://media.wiley.com/assets/61/06/lc_jb_appendix.pdf)

Kuruogul, M. and Ergen, E. (2000) The Effects of Economic Development on Project Management in Developing Countries, *Proceedings of the 2nd International Conference in Developing Countries: Challenges facing the construction industry in developing countries*. 15 –17, November, Gabarone, Botswana
(<http://www.odsf.co.za/cdcproc/1stproceedings.html>), accessed, 31/03/04.

Kyriakidou, O. and Ozbilgin, K. (2004) Individuals, organizations and careers, *Career Development International*, Vol. 9 (1), pp. 7-11

Kyriakidou, O. and Ozbilgin, M. (2004) Individuals, organisations and careers: a relational perspective, *Career Development International*, Vol. 9 (1), pp. 7-11

Larson, R.J. and Buss, M. (2005) Personality Psychology: Domains of Knowledge about Human Nature, McGraw-Hill International edition, New York.

Laryea-Adjei, G. (2000) Building capacity for urban management in Ghana: some critical considerations, *Habitat International*, Vol. 24, pp.391-401.

Latham, G. P., Fay, C. and Saari, L.M. (1979) The Development of Behavioural Observation Scales for Appraising the Performance of Foremen, *Personnel Psychology*, Vol 32, pp 299-311.

Lei Seng, W. W and Skitmore, M. (2005) Project management competencies: a survey of perspectives from project managers in Southeast Queensland, *Journal of Building and Construction Management*, Vol. 9(1), pp. 1- 12.

Leung M., Liu, A.N.N. and Thomas Ng, S. (2005) Is there a relationship between construction conflicts and participation?, *Engineering, Construction and Architectural Management*, Vol. 12 (2), pp. 149-167.

Leung M., Yu, R.K.T (2001) Investigation of Construction Conflict Resolution in Hong Kong, In: (Akintoye A (eds) 17th Annual ARCOM Conferences, 5-7 University of, 5-7 September, Salford, Vol. 1, pp. 785-92.

Leung, Mei-Yeung, NG Thomas, S and Cheung Sai-on (2004) Measuring construction project participant satisfaction, *Construction Management and Economics*, Vol. 22, pp 319-331.

- Lim, C.S. and Mohammed, Z. (1999) Criteria of project success: an exploratory re-examination, *International Journal of Project*, Vol. 17, pp. 243 –248.
- Ling, F.Y.Y (2004) How project managers can better control the performance of design and build projects, *International journal of project management*, Vol. 22, pp.477 –488.
- Ling, F.Y.Y. (2002) Model for Predicting Performance of Architects and Engineers, *Journal of Construction Engineering and Management*, ASCE, Vol. 128 (5), pp.446-456.
- Ling, Y.Y. (2003) A Conceptual Model for the Selection of Architects by Project Managers in Singapore, *International Journal of Project Management*, Vol.21, pp.135- 144.
- Liu, A. A. A. and Walker, A (1998) Evaluation of project outcomes, *Construction Management and Economics*, Vol. 16, pp. 209-219
- Liu, G., Shen, Q., Li, H., and Shen, L. (2004) Factors constraining the development of professional project management in China construction industry, *International Journal of Project Management*, Vol. 17, pp. 203 –211.
- Liyange, C.L., Egbu, C.O. and Tookey, J (2005) Research into facilities management in the health sector – a choice of

research strategy, 5th Posgraduate research conference,
Univeristy of Salford, April 13th -15th, pp, 295-502

Lock, D (1987) Project Management, *Gower Publications*, England.

Lockyer, K. G (1975) Production control in practice, Pitmann
Publising, London.

Loosemore, M., Dainty A. and Lingood, A. (2003) Managing People
in Construction Projects, Strategic and Operational
Approaches, London, Spon Press.

Lopes, G. (1998) The Construction industry and macroeconomy is
sub-saharan African country, *Construction Management and
Economics*, Vol.16, p637-649.

Lopes, L., Ruddock, L and Rebeiro, F. L. (2000) Investment in
Construction Growth in Developing Countries *Proceedings of
the 2nd International Conference in Developing Countries
Challenges facing the construction industry in developing
countries*. 15 –17, November, Gabarone, Botswana
(<http://www.odsf.co.za/cdcproc/1stproceedings.html>), accessed,
31/03/04

Lord, J.D. and Rent, G.S. (1987) Residential Satisfaction in Scattered-Site Public Housing Projects. *Science Journal*, Vol. 24, pp.287-302.

Lyons, P. (2003) Influencing performance improvement using skills charting, *Journal of European Industrial Training*, Vol 27 (8), pp. 398-404

Maisel R. and Persell, H. C. (1996) *How Sampling Works*, Pine Forge Press, Thousand Oaks. California.

Masterman, J. W. E. (2002) *Building Procurement System: An Introduction*, E&F, Spons, UK.

Maylor, M (1999) *Project Management* Gower, London.

Mbachu J. and Nkado, R. (2007) Factors constraining successful building project implementation in South Africa, *Construction management and economics*, Vol. 25, 39-54.

McCelland, D. C. (1973) Testing for Competence Rather Than for Inyelligence, *American Journal of Psychology*, Vol. 28 (1), pp. 1-14.

McCloy, A.R., Campbell, J. P., and Cudeck R. (1994) A Confirmatory Test of a Model of Performance Determinants, *Journal of Applied Psychology*, Vol.71 (2), pp 493-505.

McCrae, R.R. and Costa, P.T. (1996) Toward a new generation of personality theories; theoretical contexts of for the five factor model, In: Wiggins,J.S (ed) *The five factor model of personality*, New York:Guilford, pp. 51-87.

Mehta, R. & Bridwell, L. (2005) Innovative construction technology for affordable mass housing in Tanzania, East Africa, *Construction Management and Economics*, Vol. 23, pp. 69-79.

Meyers, L.W., Gamst, G. and Guarino, A.J. (2005). Applied Multivariate Research; Design and Interpretation, Sage Publication

Miller B.K., & Werner S. (2005) Factors influencing the Inflation of Task Performance Ratings for Workers with Disabilites and Contextual & Performane Ratings for their Co-workers. *Human Performance*, Vol. 18(3), pp. 309-329.

Ministry of Works and Housing (1986) National Housing Policy & Action Plan, 1987-1990, Accra, Ghana.

Mintzberg, R. (1980) The Nature of Managerial Work, Prentice Hall, Englewood Cliffs, NJ.

- Mirabile, R. J (1997) Everything you wanted to know about competency modelling, *Training and Development*, pp. 73-77
- Mitchell, M. and Jolley, J. (1988) Research Design Explained, Holt, Rinehart and Winston, Inc, New York.
- Moavenzadah, F. (1978) Construction Industry in Developing Countries, *World Development*, Vol. 6 (1), pp. 97-116.
- Moore D. R. and Abadi, M. (2005) Virtual Team Worknig and Associated Technologies within the UK Construction Indsutry, *Architecural Enginering and Design Management*, Vol. 1(1), pp. 21-32.
- Morel, J.C., Mesbah, A., Oggero, P and Walker, P. (2001) Building houses with local materials: means to drastically reduce the environmental impact of construction, *Building and Environment*, Vo. 36, pp. 1119-1126.
- Morris, P.W.G., Patel, M.B., and Wearne, S.H (2000) Research Into Revising the APM Project Management Body of Knowledge, *International Journal of Project Management*, Vol. 18, pp. 155-164.

Motowidlo, S.J and Scotter, R.V. (1994) Evidence that Task Performance Should be Distinguished from Contextual Performance, *Journal of Applied Psychology*, Vol. 79 (4), pp. 475-480.

Motowidlo, S.T., Borman, W.C. and Schmit, M.K. (1997) A Theory of Individual Difference in Task and Contextual Performance, *Human Performance*, Vol. 10(2), pp.71-83.

Muhlemann, A., Oakland, J., and Lockyer, K (1992) Production and Operations management, Pitman Publishing, London.

Murphy, K. R., Garcia, M., Kerkar, S., Martin, C., Balzer, K. (1982) Relationship between Observational Accuracy and Accuracy in Evaluating Performance, *Journal of Applied Psychology*, Vol. 67 (3), 320-325.

Murphy, R.K, Matin, C., and Garcia Magda (1982) Do Behavioural Observation Scales Measure Observations?, *Journal of Applied Psychology*, Vol. 67 (5), pp. 562-567.

Mustapha, F.H. and Naoum, S (1997) Factors influencing the effectiveness of construction site managers, *International Journal of Project Management*, vol.16 (1), pp. 1-8

- Muya, M., Price A.D.F and Edum-Fotwe, F.T (2006) Overview of funding for construction crafts skills training in sub-saharan Africa: a case study of Zambia, *Construction Management and Econpmics*, Vol. 24, 197-208.
- Naoum (1998) Dissertaton Research and Writing for Construction Students. Oxford, Butterworh-Heinemann.
- Newcombe, R. (2003) From Client to project stakeholders: a stakeholders mapping approach, *Construction Management and Economics*, Vol. 21, pp. 841-848.
- Ngowi, A.B. (2001) Creating Competivie Advantage by Using Environmentally-Friendly Building Processes, *Building and Environment*, Vol. 36, pp. 291-298.
- Nicolini, D. (2002) In Search of Project Chemistry, *Construction Management and Economics*, Vol. 20, pp. 167-177.
- Noguchi, M. and Hernandez-Velasco, C. R. (2005) A Mass Custom Design Approach to Upgrading Conventional Housing in Mexico, *Habitat International*, Vol.29, pp. 325-336.
- Nongiba, A.K, Gibbs, G.F and Dainty ARJ (2006) The Management of Construction Health and Safety by Small and medium Size Construction Business in Developing Countries: A Ghana case study, 22nd ARCOM,

Norusis, M. J. (2000) SPSS 10.0 Guide to Data Analysis, Prentice Hall, Englewood Cliffs, N.J

Ochieng, E & Price, A.D.F. (2005) Integration and cultural engineering on projects in developing countries (Kenya), ARCOM, Vol.21, SOAS, pp.875-884.

Odenyinka, H.A., & Yusif, A. (1997) The causes of Delay on completion of Housing projects in Nigeria. *Journal of Financial Management of Property and Construction*, Vol. 2 (3), pp. 31 -44.

Odusami, K.T (2002) Perceptions of Construction Professional Concerning Important Skills of Effective Project Leaders, *Journal of Management in Engineering*, ASCE, Vol. 18 (2), pp.61-67.

Odusami, K.T. (2003) Criteria for measuring project performance by construction professionals in the Nigeria construction industry, *Journal of Financial Management of Property and Construction*, Vol. 8 (1), 10p.

Odusami, K.T., Iyagba, R.R.O., & Onirin, M. M. (2003) The Relationship between Project Leadership, Team Cooperation and Construction Project. *International Journal of Project Management*, Vol. 21, pp. 519 –527.

Offermann, L.R., Bailey, J.R., Craig, V.S and Sass, M. (2004), The Relative Contribution of Emotional Competence and Cognitive Ability to Individual and Team Performance, *Human Performance* Vol. 17 (2), pp.219-243.

Ofori G. (1991) Programmes for Improving the Performance of Contracting Firms in Developing Countries: A Review of Approaches and Appropriate Options, *Construction Management and Economics*, Vol. 9, pp. 19-38

Ofori, G. (1984) Improving the Construction Industry in Developing Countries, *Construction Management and Economics*, Vol. 2, pp. 122-132

Ofori, G. (1989) Housing in Ghana: the case for central executive agency, *Habitat Intl*, Vol. 13, N0.1 pp. 5-17.

Ofori, G. (2000) Challenges of Construction Industries in Developing Countries, 2nd International Conference on construction in Developing Countries: Challenges facing the construction industry in developing countries, 15 –17 November, Gabarone, Botswana, (http://www.odsf.co.za/cdproc/2nd_proceedings.html, accessed, 31/03/04).

- Ogunlana, S. Siddiqui Z, Yisa, S and Olomolaiye, P. (2002) Factors and procedures used in matching project managers to construction projects in Bangkok. *International Journal of Project management*, Vol. 20, pp. 385 –400.
- Okuwoga, A.A. (1998) Cost-Time performance of public sector housing projects in Nigeria, *Habitat Intl.* Vol. 22 (4), pp. 389-395.
- Olomolaiye, A. and Egbu, C. (2004) The Significance of Human Resource Issues in Knowledge Management within the Construction Industry – People, Problems and Possibilities, In: Khosrowshahi, F (ed) *20th Annual ARCOM Conference*, Heriot Watt University, September, 1-3, Vol. 1, pp. 533-540
- Olomolaiye, P.O., Wahab, K.A and Price A.D.F (1987) Problems Influencing Craftsmens Productivity in Nigeria, *Building and Environment*, Vol. 22 (4), p. 317-323.
- Ones, D.S and Viswesvaren, C (1996) Bandwidth-Fidelity Dilemma in Personality Measurement for Persennel Selection, *Journal of Organizational Behaviour*, Vol 17, pp.723-736.
- Opppenheim, A. N. (1992) Questionniare design, interviewing and attitude measurement, New Edition, Continuum, London

Organ, D.W and Piane, J.B (1999) A New Kind of Performance for Industrial and Organizational Psychology. Recent Contribution to the Study of Organizational Behaviour, In Cooper and Robertson (Eds), *International Review of Industrial and Organizational Psychology*, Vol. 14, pp. 337-368.

Osei-Tutu E and Adjei-Kumi, T (2002) The Cost Trends of Residential Housing Provision in Urban Areas in Ghana from 1991-2001, Building and Road Research Unpublished paper.

Ozsoy A., Atlas, N. E and OK, V. and Pulat, G. (1996) Quality Assessment Model for Housing; a case study of Istanbul on outdoor spaces in Istanbul, *Habitat International*, Vol. 20. 2, pp. 163-173.

Parker N.A., Lema, N.M and Mligwa, G. (1987) An Analysis of Labour Productivity in Tanzania, University of Dar es Salam and National Construction Council.

Pasquire, C (1999) The Implication of Environmental Issues on the UK Construction management, *Engineering, Construction and Architecture Management*, Vol. 6(3), pp. 276-86.

Pathirage C.P, Amaratunga R.D.G. and Haigh R (2005) Knowledge management research within the built environment: Research

Methodological Respective, 5th International Postgraduate Research Conference, April 14th – 15th.

Pheng L.S. and Hiu, M.Z. (1999) The Application of JIT Philosophy to Construction: A Case Study in Site Layout, *Construction Management and Economics*, Vol. 17, pp.657-668.

Pheng S.L. and Chuan, Q.T. (2006) Environmental Factors and Work Performance of Project Managers in the Construction Industry, *International Journal of Project Management*, Vol. 24, pp. 24-37.

Picard R.R and Berk, K.N (1990) Data Splitting, *American Journal of Statistics*, Vol. 44, pp. 140-147.

Pickett, L. (1998) Competencies and managerial effectiveness: putting competencies to work, *Public Personnel Management*, Vol. 27 (1), pp. 103-114

Pierce, C. (1994) Executive Competencies: Research Issues, Activities and Responses, *Executive Development*, Vol. 7(4), pp. 18-20.

Pillai, A.S., Joshi, A. and Rao, S. K. (2002) Performance measurement of R & D projects in a multi-project, concurrent

engineering environment, *International Journal of Project Management*, Vol. 20, pp. 165-177.

Pinto J .K. and Slevin, D .P. (1988) Project Success: definition and measurement techniques, *Project Management Journal*, Vol 19(1), pp. 67-71

Pinto, J.K. and Kharbanda, D. (1995) Project management and conflict resolution, *Project Mangement Journal*, Vol. 26 (4), pp. 45-54.

Plessis C. (2007) A Strategic framework for Sustainable Construction in developing countries, *Construction Management & Economics*, Vol. 25 , pp. 67 -76.

Pollack J. (2007) The changing paradigms of projects management, *International Journal of Project Management*, Vol. 25, pp. 266-274

Poon, C.S., Wan yu, T A., Wong S.W. and Cheung E. (2004) Management of construction waste in public housing projects in Hong Kong, *Construction Management and Economics*, Vol. 22, pp.675-689.

President of Ghana (2005) State of the Nation Address, www.Ghanaweb.com (accessed, February 2005).

- Proverbs, D. G. (1998) A Best Practice Model for High Rise Insitu Concrete Construction Based on French, German and UK Contractor Performance Measures, Phd Thesis (Unpublished), University of Wolverhampton, UK.
- Ramirez, R. R., Alarcon, L. F.C. and Knights P. (2004) Benchmarking System for Evaluating Management Practices in the Construction Industry, *Journal of Management in Engineering*, ASCE, Vol. 20 (3), pp.110-117.
- Ramo, H. (2002) Doing the right thing and doing the right things: time and timing projects, *International Journal of Project Management*, Vol. 20, pp. 569-574
- Reber, A.W (1985) Dictionary of psychology, London, Penguin.
- Remenyi, D. Williams, B., Money, A and Swatz, E (1998) Doing research in business and management, Sage, London
- Reymont, R., & Joreskog, K.G. (1993). Applied factor analysis in the natural sciences. New York: Cambridge University Press.
- Roberts, G. E. (1998) Perspectives on enduring and emerging issues in performance appraisal, *Public Personnel Management*, Vol. 27 (3), pp. 301-314.

- Robins, S. T. (1998) Organizational behaviour: concepts, controversies and application, Prentice Hall International Edition, New York
- Rosenau, M (1984) Project Management for Engineers, Van Nostrand, Reinhold, New York, N.Y.
- Roy, C. and Cochrane, S. P. (1999) Development of a Customer Focused Strategy in Speculative HouseBuilding, *Construction Management and Economics*, Vol. 17, pp. 777-787.
- Roy, R., Brown, J and Gaze, C. (2003) Re-engineering the construction process in the speculative house-building sector, *Construction Management and Economics*, Vol. 21, pp137-146.
- Rukuro W.R and Olima W.H.A (2003) Developer profits undermine residents' satisfaction in Nairobi's residential neibourhood: implication for local government in Kenya, *Habitat International*, Vol. 27, pp. 143-157.
- Russell, J.S., Jaselkis, E.J and Lawrence, S.P. (1997) Continuous Assessment of Project Performance. *Journal of Construction Engineering and Management*, Vol. 123, March, pp. 64 –71.

- Rwelamila, P. D. O (2007) Project management competence in public sector infrastructure organisations, *Construction Management and Economics*, Vol.25, pp. 55-66
- Sadeghpour, F., Moselhi, O., AlKass, S.T (2006) Computer Aided Site Layout Planning, *Journal of Construction Engineering and Management*, ASCE, Vol. 132 (2), pp. 143-151.
- Schmidt, F.L., Hunter, J. E.,and Outrbridge A.N. (1986). Impact of Job experience and ability on job knowledge, work sample performance and supervisory ratings of job performance. *Journal of Applied Psychology*, Vol. 71, 432-439
- Schultze, G and Miller, C. (2004) The search for meaning and career development, *Career Development International*, Vol. 9 (2), pp. 142-152
- Schwartzkopf, W (1995) Calculating lost productivity labour productivity in construction claims, John Wiley and Sons Inc, New York
- Scott, W.D. (1917) A fourth method of checking results in vocational selection, *Journal of Applied Psychology*, Vol. 1, pp.61-67.
- Scullen, S. E., Judge, T.A and Mount, M. K (2003) Evidence of the Construct Validity of Developmental Ratings of Managerial

Performance, *Journal of Applied Psychology*, Vol.88, (1), pp 50-66.

Seiwart, L.J (1989) *Managing your Time*, Kogan Page Ltd, London

Seng Lei, W.W and Skitmore, M (2004) Project management competencies: a survey of perspectives from project managers in Southeast Queensland, *Journal of Building and Construction Management*, Vol. 9(1), pp. 1-12.

Sexton R. (2003) Axiological Purposes, Ontological Cage and Epistemological Keys, Postgraduate Research Workshop, University of Stafford

Shen Q. and Liu G. (2003) Critical success factors for value Management studies in constructionm *Journal of construction engineering and management*, ASCE, Vol. 129, (5) ,pp. 485-491.

Skipper, C.O. and Lansford, C.B. (2006) Assessment with 360 degrees Evaluations of Leadership Behaviour in Construction Project Managers, *Journal of Management in Engineering*, Vol. 22 (2), pp.75-80.

Smallwood, J. (2000) Practising the Discipline of Construction Management: Knowledge and Skills, *2nd International*

Conference on construction in Developing Countries: Challenges facing the construction industry in developing countries, 15 -17

November, Gabarone, Botswana, (http://www.ods.co.za/cdproc/2nd_proceedings.html), accessed, 31/03/04

Smyth H.J. and Morris, P.W.G. (2007) An Epistemological Evaluation of Research Into Projects and Their Management: Methodological Issues, *International Journal of Project Management*, Vol. 25, pp. 423-436.

Snee, R.D (1977) Validation of regression models: methods and examples, *Technometrics*, Vol. 19 (4), 14 pages.

Soderland, J (2004) Building theories of project management: past research, questions for the future, *International Journal of Project Management*, Vol. 22, pp. 189-191.

Spencer L. and Spencer S. (1993) *Competence at work: model for superior performance*, New York, John Wiley and Sons, Inc.

Spencer, L. M. (2001) The economic value of emotional intelligence competencies and EIC based human resource programs, In Cherniss, C and Goleman, D (eds.), *The emotional intelligence workshop*, San-Francisco-Bay: Jossey-Bay, pp. 45-82.

Stevens J.P. (1992) *Applied Multivariate Statistics for the Social Sciences* (2nd Edition) Hillsdale, NJ: Erlbaum.

Struckenbruck, L. C. (1987) Who determines project success. *Project Management Institute Seminar/Symposium*, Canada, September, pp. 13-21.

Struckenbruck, L.C and Zomorrondin, L. A (1987) Project management: the promise for developing countries, *Project Management Journal*, Vol. 5 (3), August, 1987

Sutrina, M (2004) An intelligence model for evaluating civil engineering works, Phd thesis, University of Wolverhampton

Tam, C.M., Deng, S. X. and Ho, C.S. (2000) Performance assessment scoring system of public housing construction for quality improvement in Hong Kong, *International Journal of Quality and Reliability Management*, Vol. 17 Nos 4/5, pp. 467-478.

Tam, C.M., Deng, Z.M and Zeng S .X. (2002) Evaluation of Construction Methods and Performance for High Rise Public Housing Construction in Hong Kong, *Building and Environment*, Vol. 37, pp. 983-991.

- Teeraegtugul, W and Chaoenngam, C (2004) Investigating the key knowledge creation process amongst Thai construction project managers, In Ogunlana et al (Eds): *The Construction Industry in Developing Countries, International Conference on Globalization and Construction*, Asian Institute of Technology (AIT), Bangkok, Thailand, 17-19, pp. 262-271
- Tett, R. P., Guterman, A.B, Bleir, A. and Murphy, P. J. (2000) Development and Content Validation of a Hyperdimensional Taxonomy of Managerial Competences, *Human Performance*, Vol. 13 (3), pp. 205-251.
- Themistocleus, G and Wearne, S.H (2000) Project Management Topics Coverage in Journals, *International Journal of Project Management*, Vol. 18, pp. 7-11.
- Thomas, H.R., Mathews, C.T. and Ward, J.G. (1986) Learning Curve Model of Construction Productivity, *Journal of Construction Engineering and Management*, ASCE, Vol. 112, pp. 245-258.
- Tipple, G. and Korboe, D. (1998) Housing Policy in Ghana: Towards a Supply-Oriented Future, *Habitat International*, Vol. 22 (3), pp. 245-257.
- Tipple, G., Korboe, D., Garrod, G & Willis, K. (1999) Housing supply in Ghana: a study of Accra, Kumasi & Berekum. *Progress in Planning*, Vol. 51(4), pp. 253 -324.

- Tommelien, I.D. and Levit R.E. and Hayes-Roth, B. (1992) Sight Model for Site Layout, *Journal of Construction Engineering and Management*, ASCE, 118 (4), pp.749-766.
- Toole, M (1998) Uncertainty and homebuilders adoption on innovations, *Journal of Construction Engineering and Management*, ASCE, Vol. 124 (4), pp. 323-332
- Torbica, M.Z. and Stroh, R.C. (2001) Customer Satisfaction in Home Building, *Journal of Construction Engineering and Management*, Vol. 127 (1), ASCE, 82-86.
- Trejo, D., Patil, S., Anderson, S. and Cervantis E. (2002) Framework for Competency and capability: assessment for resources allocation, *Journal of Management Engineering*, Vol. 18 (1), pp. 44-49.
- Tsui, A.S. and Ohlott, P. (1988) Multiple Assessment of Managerial Effectiveness: Interrater Agreement and Consensus in Effectiveness Models, *Personnel Psychology*, Vol. 41, 779-803.
- Turin, D. A (1973) The construction industry: its economic importance and its role in Development, UCERG, London
- Turner, J.R (1993) The Handbook of Project Based Management, McGraw-Hill, London.

UK trade and Investment (2004) Export Information. (<http://www.tradepartners.gov.uk/building/Ghana/profile/overview.shtml> , accessed Feb 20, 2004).

Ukoha, O. M and Beamish, J. O (1997) Assessment of Residents' Satisfaction with Public Housing in Abuja, Nigeria, *Habitat International*, Vol. 21 (4), pp. 445-460.

United Nations (1965) United Nations Committee and Housing, Building and Planning, effect of repetition on building operations and processes on site, New York

Van Scotter, J. R. and Motowidlo, S. J. (1996) Interpersonal Facilitation and Job Dedication as Separate Facets of Contextual Performance, *Journal of Applied Psychology*, Vol. 81 (5), pp 525-531.

Wachira, I. N (2000) Labour Management in Kenya 2nd International Conference on construction in Developing Countries: Challenges facing the construction industry in developing countries, 15 –17 November, Gabarone, Botswana, (http://www.odsf.co.za/cdproc/2nd_proceedings.html, accessed, 31/03/04)

Wahab, K.A. (1980) Manpower Requirements in a Selected number of Housing Projects in Nigeria, *Building and Environment*, Vol. 15, pp. 33-43.

Wahab, K.A. (1984) Target Output in Nigerian Construction Industry, *Study in Environmental Design in West Africa*, Vol. 2

Walker, A. (2002) Project management in Construction, Blackwell science, UK.

Walker, D.H.T (1997) Choosing a research methodology, *Construction Management and Economics*, Vol. 15, pp. 149-159

Walliman, N. (2001) Your Research Project: a step-by –step guide for the first time researcher, Sage Publications.

Warren, H.C. (1934) Dictionary of psychology Boston: Houghton-Mifflin

Wateridge, J (1998) How can IS/IT projects be measured for success, *International Journal of Project Management*, 1998, 16(1), pp. 59-63.

Webster new world dictionary (1967), Schools and office Edition, World Publisihing Company, Cleveland, Ohio

Wells J. (2007) Informality in the Construction Industry in Developing Countries, *Construction Management & Economics*, Vol. 25, pp. 87-93.

Wells, J. (1987) *The Construction Industry in Developing Countries, Alternative Strategies for Development*, Croom, Helm Ltd.

Wells, J. (1999) *The Construction Industry in Low Income Countries: An Agenda for Research*, Proceedings of the 1st Conference of CIB TG 29 on Construction in Developing Countries: Construction Industry Development in the Millennium, Singapore, 27-29 October, (http://www.odsf.coza/cdcproc/1st_proceedings.html, accessed, 31/03/04).

White, G. and Burgess, R. A (1979) *Building Production and Project Management*, Longman Inc, New York.

Wilkinson, D. & Birmingham, P. (2003) *Using Research Instrument: A Guide for Research*, Routhledge-Famer, Taylor-Francis Group, New-York.

Windapo, A.O., Ogunsami, O.E. and Iyagba, O. A. (2004) *Modelling the Determinants for Housing Construction in Nigeria*, In Ogunlana et al (Eds): *The Construction Industry in Developing*

Countries, International Conference on Globalization and Construction, Asian Institute of technology (AIT), Bangkok, Thailand, 17-19 November, pp. 632-645.

Woerkom, M., Nyhof, W.J. and Nieuwenhals, L.F.M (2002) Critical reflective working behaviour: a survey research, *Journal of European Industrial Training*, Vol. 26/8, pp. 375-383

World Bank Database (2004) African Development Indicators, The World Bank, Washington, D.C.

Xiao, H and Proverbs, D (2003) Factors influencing contractor performance: an international investigation, *Engineering, Construction and Architectural Management*, Vol. 10 (5), pp. 322-332.

Xiao, Hong (2002). A Comparative Study of Constructor Performance based on Japanese, UK & US Construction practice, Unpublished Phd, University of Wolverhampton, UK.

Yang, L.R., O'Connor, J.T. and Wang, C.C. (2006) Technology utilization on different sizes of projects and associated impacts on composite project success, *International Journal of Project Management*, 24, pp, 96-105

Yasamis, F., Arditi, D and Mohammadi, J. (2002) Assessing contractor quality performance, *Construction Management and Economics*, Vol. 20, pp. 211-223.

Yin K (2003) Case studies Research Design & Methods. 3rd page publication, London.

Zammuto, R.F. (1984), A comparisons of multiple constituency models of organizational effectiveness, *Academy of Management Review*, Vol. 9, pp. 606-616.

Zawdie, G. and Langford, D.A. (2000) The State of Construction Infrastructure in sub-Saharan Africa and Strategies for a Sustainable way forward, Proceedings of the 2nd International Conference in Developing Countries: Challenges facing the construction industry in developing countries. 15 –17, November, Gabarone, Botswana (<http://www.odsf.co.za/cdcproc/1stproceedings.html>), accessed, 31/03/04.

BIBLIOGRAPHY

BIBLIOGRAPHY

- Ahadzie, D.K (1995) Factors affecting labour productitivity in the construction industry in Ghana: the perception of consultants and contractors, *Journal of the Building and Road Research Institute*, Vol. 3 (1/2), pp. 22-32
- Ahadzie, D.K. (1993) A strategic guide for improving productivity in the construction industry in Ghana, MSc Dissertation (Unpublished), University of Manchester Institute of Science and Technology, UK
- Ahadzie, D.K. (2000) An investigation into the methods for productivity measurement in the construction industry in Ghana, *Journal of the Building and Road Research Institute*, Vol. 3 (1/2), pp. 29-39
- Alarcon, L.F.(2001) Learning from collaborative benchmarking in the construction industry, 9th International Conference Group for Lean Construction, National University of Singapore, Singapore, pp. 401- 415.
- Alkass, S., Mazerolle, M., and Frank, H. (1998) Rigour in research and peer-review: a reply, *Construction Management and Economics*, Vol. 16, pp.139-140

- Amoa-Mensah, K. (1990) A report on the construction of social security and national insurance trust (SSNIT) housing estates in Ghana (Unpublished document) Building and Road Research Institute Bulletin.
- Arumala, J.O. and Copeland, L.L (2005), Affordable Housing in Developing Countries: The UMES experience in Ghana. ASC proceedings of the 41st Annual Conference, University of Cincinnati, Ohio, April 6-9.
- Barber, E. (2004) Benchmarking the management of projects: a review of current thinking, *International Journal of Project Management*, 22, pp. 301-307.
- Bernadin, A.J. and Buckley, M.R. (1981) A Consideration of Strategies in Rater Training, *Academy of Management Review*, Vol. 6, pp.205-212.
- Bernadin, H.J. (1977) Behaviour Expectations Scales versus Summated Scales: A fair comparison. *Journal of Applied Psychology*, Vol. 62, pp. 422-427
- Betts M and Lansley, P (1995) International journal of project mangement: a review of the first ten years, *International Journal of Project Management*, Vol. 13, pp. 207-217.

- Borman W. C. (1975) Effects of Instructions to avoid Halo Error on Reliability and Validity of Performance Evaluation Ratings, *Journal of Applied Psychology*, Vol. 60, pp. 556-560.
- Borman, W.C (1974) The Ratings of Individuals in Organizations: An Alternative Approach to Organizational Behaviour and Human Performance, *Journal of Applied Psychology*, Vol. 12, pp. 105-124.
- Briscoe, G. (1988) The Economics of the Construction Industry, B.J. Bartsfrod Ltd, London.
- Brown, E.M. (1968) Influence of Training Methods and Relationship on the Halo Effect, *Journal of Applied of Psychology*, Vol. 52, pp.195-199.
- Chileshi, N. (2005) PhD in Construction management research: what is original contribution to knowledge, ARCOM, SOAS, Vol. 21, pp.1267-1277.
- Construction Best Practice Programme 2002), <http://www.cbpp.org.uk>, (18/01/05)
- Construction Industry Institute (2003) Benchmarking and Metrics, <http://www.cii-benchmarking.org/mission.cfm> (24/12/04)
- Cooke-Davies, T.J. and Arzymanov, A. (2003) The Maturity of Project Management in Different Industries: An Investigation

into Variations Between Project Management Models,
International Journal of Project Management, Vol. 21, 471-
478.

Cooper, R. A and Weekes, A. J. (1983) Data, models and statistical
analysis, Phillip Allan, Oxford, UK.

Costa, B.D., Lima, H.R and Formosa, C.T. (2004) Performance
Measurement Systems for Benchmarking in the Brazilian
Construction Industry, In (Eds. Ogunlana et el) *Proceedings,
Globalization and Construction*, AIT Conference Centre,
Bangkok, Thailand, 17 -19 November, pp, 1030-1039.

Drucker, J. and White, G. (1995) Misunderstood and undervalued?
Personnel management and construction, *Human Resource
Management Journal*, Vol. 5 (3), pp. 77-91.

Drucker, J., White, G., Hegewisch, A et al (1996) Between hard and
soft HRM; human resource management in the construction
industry, *Construction Management and Economics*, Vol. 14,
pp. 405-416.

Egan, J.L. (1998) Rethinking Construction, Department of Trade
and Industry, United Kingdom.

Eyiah, A.K. & Cook, P. (2001) Financing small and medium-scale
contractors in developing countries: a Ghana case study,

Construction Management and Economics, Vol. 21, June, pp 357-367.

Feldman, J.M (1981) Beyond Attribution Theory: Cognitive Processes in Performance Appraisal, *Journal of Applied Psychology*, Vol. 66, pp. 127-148

Frankfort-Nachmais and Nachmais, D (1996) Research Methods in the Social Sciences, Arnold, London

Frimpong Y., Oluwoye, J and Crawford, L (2003) Causes of Delay and Cost Overruns in Construction of Groundwater Projects in Developing Countries: Ghana as a Case Study, *International Journal of Project Management*, Vol. 21 ,pp. 321-326

Gall D.M, Walker, R and Borg, J (1996) Educational Research; an introduction, United Kingdom.

Ganessan, S. (1983) Housing and Construction: Major Constraints and Development measures *Habitat International*. Vol. 7, 5/6, pp 173-194.

Governance and Project Management, Editorial, *International Journal of Project Management*, Vol. 24, pp. 93-95.

- Harris, C. (1998) Why research without theory is not research; a reply to Seymour, Crook and Rooke, *Construction Management and Economics*, Vol. 16, pp. 113-116.
- Harvey, R. C and Ashworth, A. (1997) *The Construction Industry of Great Britain*, Laxtons, Oxford
- Holt et al (1995) *Research methods for Built Environment Students*, University of Wolverhampton, UK.
- Hulin, C.L (1982) Some Reflections on General Performance Dimensions and Halo Rating Error, *Journal of Applied Psychology*, Vol. 67 (2), pp.165-170.
- Kamaraswamy, M. M. and Thorpe, A. (1996) A Computerised Construction Project Management Evaluation System, *Advances in Engineering Software*, Vol. 25, pp.197-206.
- Kasilingham, R.G. (1999) *Logistics and Transportation Design and Planning*, Kluwer Academic Publishers, London.
- Landy, F.J and Farr, J (1980) Performance Ratings, *Psychological Bulletin*, Vol. 87, 72-82.
- Latham, G.P., Wexley, K.N and Pursell, E.D (1975) Training managers to minimize ratings errors in the observation of behaviour, *Journal of applied psychology* Vol. 80, pp. 550-555.

- Laurent, L., and Jacques, M. (1990), (eds) European Housing Conference, Proceedings 7 –8, Co face. Brussels.
- Liu, A. M.M. (2003) The Quest for Quality in Public housing projects: a behaviour-to-outcome paradigm, *Construction Management and Economics*, Vol. 21, pp.147-158.
- Lord, J.D and Rent, G.S (1987) Residential Satisfaction in Scattered-Site Public Housing Projects. *Science Journal*, Vol. 24, pp.287-302
- Mansfield, N.R., Ugwu, O.O., & Doran, T. (1994) Causes of delay and cost overruns in Nigerian construction projects, *International Journal of Project Management*, Vol. 12 (4), pp. 254 -260.
- Mead, R., Curnow and Hasted, A.M (1993) Statistical Methods in Agriculture and Experimental Biology, Chapman and Hall.
- Mitchell, M & Jolley, J (1988) Research design explained, Holt, Rinehart and Winston, New York.
- Mukhija, A. (2001) Upgrading housing settlements in developing countries: The impact of existing physical conditions. *Cities*, Vol. 18, (4), pp 213-222.

- Muriithi N and Crawford, L (2003) Approaches to Project Management in Africa: Implications for International Development Projects, *International Journal of Project Management*, Vol. 21, pp. 309-319.
- Murphy, K. (1982) Difficulties in statistical control of Halo, *Journal of Applied Psychology*, Vol. 67 (2), pp161-164.
- Murphy, K. R., Garcia, M., Kerkar, S., Martin, C., Balzer, K (1982b) Relationship between Observational Accuracy and Accuracy in Evaluating Performance, *Journal of Applied Psychology*, Vol. 67 (3), 320-325.
- Murphy, R.K, Martin, C., and Garcia Magda (1982c) Do Behavioural Observation Scales Measure Observations?, *Journal of Applied Psychology*, Vol. 67 (5), pp 562-567.
- Ndekugri, I.E. and McCaffer, R. (1988) Management information flow in construction companies, *Construction Management and Economics*, Vol. 6, pp. 273-294.
- Ott, R.L (1993) An Introduction to Statistical Methods and Data Analysis, Duxbury Press, USA

- Owusu- Adade, K (1995) Towards Increased Housing Delivery in Ghanaian Cities: The Land Factor, *Journal of the Building and Road Research Institute*, Vol. 3 (1 &2), June/Dec, pp. 12-14.
- Oyegoke, A. S (2001) UK and US Construction Management Contracting Procedures and Practices: A Comparative Study, *Engineering, Construction and Management*, Vol. 8 (5/6), pp. 403-417.
- Pinto J.K. (2000) Understanding the Role of Politics in Successful Project Management, *International Journal of Project Management*, Vol. 18, pp. 85-91.
- Salkind, N. J (2000) Statistics for People Who (think they) They Hate Statistics, Sage Publications, London.
- Schrenkenbach, H. & Abankwa, K. (1984) Construction Technology for a Tropical Developing Country, GTZ, Germany.
- Seymour, D., Crook, D., and Rooke, J., (1998) The role of theory in construction management: reply to Runeson, *Construction Management and Economics*, Vol. 16, pp. 109-112
- Takim R., Akintoye, A and Kelly, J (2004) Performance Measurement in Construction, *Proceedings, ARCOM, 19th Conference*, Vol. 1 University of Brighton, pp. 423-431.

- Tang, T. L., Ibrahim, A.H.S (1998) Antecedents of organisational citizenship behaviour revisited: public personnel in the US and in the Middle East, *Public Personnel Management*, Vol. 27 (4), pp. 529-550
- Taylor, E.K and Hastman, L (1956) Relation of Format and Administration to the Characteristics of Graphic Rating Scales, *Journal of Applied Psychology* Vol. 9, pp. 181-206.
- Tsui A. S. (1984) A Multiple-Constituency Framework of Managerial Reputation Effectiveness, In Hunt et al (eds) *Leaders and managers: International Perspective Personnel Psychology*, Vol. 41, 779-793.
- Turner, J.R (2006) Towards a Theory of Project Management: The Nature of the Project
- Weitz, J. (1961) Criteria for Criteria, *American Psychologist*, Vol.16, pp.228-232.
- Wilkinson, S. (2001) An Analysis of the problems faced by project management companies managing construction projects, *Journal of Engineering, Construction and Architectural Management*, Vol. 8 (3), pp.160-170.

Woodward, J. F. (1997) Construction Project Management. Getting it Right first time, Woodward and Thomas Telford Services LTd, UK.

APPENDICES

Appendix 1: General Attributes for evaluating the PMs' performance

	Ogunlana et al (2003)	Ling (2003)	Ling (2002)	El-Saaba (2001)	Muriithi and Crawford (2003)	Dainty et al (2003)	Brown and Adams (2000)	Edum-Fotwe (2000)	Lei and Skitmore (2004)	Ling (2004)	Odusami (2002)	Chan et al (2004)	(1996)Kumaraswamy and Thorpe	Odusami et al (2003)	Morris et al (2000)	Fraser (1999;2000)	Musthpah and Naoum (199)	Egbu (1999)	Fraser (2003)
Creativity and innovativeness	✓	✓	✓						✓										
Problem identification ability	✓					✓													
Problem solving ability		✓	✓			✓			✓										
Mental alertness	✓																		
Ability to think ahead																			
Good project approach		✓	✓									✓							
Intelligence	✓																		
Emotional stability	✓																		
Physical condition	✓																		
Self Confidence	✓																		
Sense of Humour																			
Judgement	✓																		
Sense of responsibly	✓																		
Pride in performance	✓																		
Communication	✓					✓		✓							✓	✓	✓	✓	
Sensitivity	✓																		
Negotiation skills	✓							✓	✓						✓	✓	✓	✓	
Experience	✓	✓	✓									✓							
Maturity	✓													✓					
Educational qualification	✓													✓					

[illegible]

Commitment		✓				✓						✓			
Knowledge transfer						✓			✓						
IT skills								✓	✓						
Legal skills								✓	✓						✓
Health and safety issues						✓		✓	✓		✓	✓	✓		✓
Honesty						✓									
Dedication						✓									
Commercial awareness						✓									✓
Rapid understanding of situations and issues						✓									
Ambition						✓									
Enthusiasm		✓				✓									
Dedication															
Managing client relations									✓						
Presentation skills															
Business acumen						✓			✓						✓
Self-discipline						✓									
Understanding organizational objectives												✓			
Coordination skills						✓						✓			
Achieving production targets						✓			✓						
Cultural background		✓			✓										
MusculinityAssertiveness		✓				✓			✓						
Motivation		✓				✓		✓	✓		✓	✓			
Flexibility		✓				✓			✓			✓			
Stakeholders Satisfaction		✓				✓			✓			✓			

Appendix 2: Potential Dimensions of Management Skills Profile-Industrial/psycho perspective

Dimension	Definition
Delegating and Controlling	Assigning tasks to others and ensuring that they have the necessary resources and authority; monitoring progress and exercising control
Personal Organization and Time Management	Using time efficiently; arranging information effectively without being mired in detail
Planning	Setting goals and developing strategies for meeting those goals
Information	Letting people know of relevant information on a timely basis
Coaching and Developing	Evaluating employees, providing feedback and facilitating professional growth
Organizing	Coordinating work of others; setting priorities; establishing efficient work procedures
Human Relations	Developing and maintaining good working relationship with others; showing considerations for the opinions and feelings of others.
Listening	Paying attention to, and conveying understanding of, others when speaking.
Motivating Others	Creating an environment in which subordinates and others are rewarded for accomplishment of group and individual goals
Conflict management	Arriving at effective solutions to conflict while maintaining good working relations.
Personal Adaptability	Responding well to the demands of work challenges when confronted with changes, ambiguity, adversity or other pressures.
Occupational and Technical Knowledge	Applying knowledge and skills needed to do the job; technical expertise in own field; familiarity with organization and industry
Problem Analysis and Decision-Making	Identifying problems and alternative solutions; making timely, sound decisions
Personal Motivation	Displaying a high energy level; working long and hard to get things done; seeking increased responsibility on the job
Financial and Quantitative	Drawing accurate conclusions from financial and numerical material and applying quantitative techniques to management problems
Oral Communication	Speaking effectively one-to one and groups; making effective presentations
Written Communication	Writing clearly and effectively in business communications

Leadership Style and Influence	Task charge; directing others' activities towards meaningful goals; commanding respect
Results Orientation	Measure of overall performance,
Source: Johnson et al (1997)	

Appendix 3: Potential Dimension of Project managers' skills profile in construction

Dimension	Definition
Team building	Bringing the team together, adapting working methods and developing good internal relations (team formation and development); appreciating team members strengths and weaknesses, listening to their concerns and developing a culture of mutual respect (people management); ensuring that the team are motivated and enjoy working for the organization in order to promote stability (maintaining low staff turnover); showing understanding and empathy, focus rather than attributing blame during crises (supportiveness)
Leadership:	Evaluating project performance parameters to ensure that deficiencies are addressed quickly (monitoring and evaluation); foreseeing problem issues and taking action to avoid them (forward thinking); taking responsibility for the tasks and not delegating blame, understanding individuals needs, protecting team members interest (responsibility); offering guidance and providing help, advice and assistance as appropriate (direction); delegating and empowering the right people with appropriate task and responsibilities, ensuring effective upstream reporting of task progress and performance (delegation); having confidence to deal with problems, letting people know what you want to be an effective manner (assertiveness); being able to adapt to different situations; understanding and appreciating different and opposing perspectives on issues (flexibility)

Decision-making:

Unbiased and objective decisions, knowing when to make decisions themselves or take on board others' comments; awareness of the wide impact of decision made (clear decision making approach); prioritizing issues in accordance with their influence on project success (recognising key issues); Understanding health and safety risks, and managing construction activities in a way which ensure the welfare of all those involved with the project (safety management awareness); taking a thorough, well thought out approach to solving unexpected problems (problem solving); understanding risk, discussing them with team members and managing them in a way that mitigates their impact (risk management); managing resources in a way that meets outturn production targets (achieving production targets); ensuring that the team and resources work together coherently and smoothly (coordination skills)

Mutuality and approachability:	Developing a culture of mutual respect and trust with the team, supporting staff who want to take on more responsibility, involving people in decision making and providing autonomy (mutuality and trust); breaking down hierarchical barriers to ensure open and honest relations between all team members (approachability)
Honest and Integrity:	Being honest with both the client and project team, managing expectations appropriately (honesty); Keeping promises and adhering to agreed actions (integrity); putting project goals and the organizational mission before personal preferences (commitment); understanding weaknesses and how to overcome them (admitting weaknesses)
Communication:	Explaining issues to others through written, oral and non-verbal communications (communication); transferring knowledge to others within the team in an open and effective way to ensure the achievement of project goals (knowledge transfer)
Learning, understanding and application:	The ability to grasp situations quickly and understand their implications (rapid understanding of situations); learning from experience and relating this to relevant areas in future projects (learning from mistakes); anticipating and recognising potential problems, resolving problems before they escalate (problem identification); understanding commercial aspects of projects and issues arising during projects (commercial awareness); ensuring that there are no loose ends, demonstrating completeness and attention to detail (thoroughness); demonstrating technical skills and knowledge related to the production function(technical expertise)
Self-efficacy:	Driven by the need to ensure a successful outcome for the project, showing a genuine concern for working well or for achieving a standard of excellence (task motivation); showing loyalty and commitment to the project and to organization through their work ethic and commitment (dedication); demonstrating an ability to develop innovative solutions which will improve project performance and avoid problems (initiative); demonstrating a liking of and enthusiasm towards the job (enthusiasm); demonstrating a degree of self-restraint and control when dealing with subordinate (self-discipline); ensuring that time is spent dealing with the high priority issues (time management); demonstrating a drive and ambition towards personal carer development(ambition)
External relations:	Developing and maintaining positive, open relations with clients representatives in a way that encourages successful long-term relationship (managing client relationships); effective

marketing and presentation of team and individual abilities (presentation skills); understanding the broader business environment on which their organization operates (business acumen); taking account of the wider business needs of the organization and aligning project management approaches with longer-term strategic objectives (understanding organizational objectives)

Coordination and planning of site works
Preparation of programmes
Scheduling subcontractor timetables
Assigning tasks and providing instructions
Checking drawings
Discussing quality of work
Ordering materials, plant and tools
programme
Technical understanding
Human resources planning
Staff selection
Site training of staff
Managing routine operational problems
Diagnosis of defects and agreement of remedies
Urgent purchase of materials/hiring of plant
Managing health and safety
Selection of appropriate construction methods
Dealing with work variations
Reacting matters raised by others
Delegation of tasks to others
Completion of written works relating to projects
Processing correspondence with other parties
Maintenance of adequate filing systems
Preparation of costs and progress reports
Answering routine procedural questions
Receiving and disseminating requested information
Holding regular meetings
Conveying minutes of meetings
Availability of manager for work related consultation
Inspection of work
Walking about site
Monitoring performance data
Requesting input and participation from others
Listening with open mind to work suggestions
Conveyance of appreciation
Provision of reward
Provision of performance feedback
Delegation of authority
Delegation of responsibility
Backing of subordinates
Enforcement of company policy
Following of official disciplinary procedures

Provision of negative performance feedback
 Liaison with clients representative
 Community service activities
 Managing interpersonal conflict
 Managing contractual conflict
 Honesty
 Ethical behaviour
 Upholding of company values
 Non-work related discussion
 Out of work socialization

Social skills
 Decision making skills
 Handling problems
 Recognizing opportunities
 Managing change
 Ability to handle stress
 Judgment
 Technical knowledge
 Accuracy
 Communication
 Responsibility acceptance
 Utilization of resources available

Leadership
 Communication (oral/written)
 Motivation of others
 Health and safety
 Decision making
 Forecasting and planning
 Site organization
 Budgetary control
 Supervision of others
 Team building
 Quality control and assurance
 Managing time
 Materials planning and control
 Setting objectives and goals
 Conducting meetings
 Managing conflict/crises
 Recruit/select:supervisor/foreman
 Delegating responsibilities
 Programme maintenance (update)
 Tenant welfare
 Public relations
 Employee training
 Competitive tendering
 Analysis of project risks
 Programme design
 Identifying personal strengths/weaknesses
 Employee training programme
 Site security
 Productivity maintenance and control
 Negotiate: client
 Costing and estimating
 Competitor awareness
 Organisation of communication systems
 Managing job stress
 Managing change
 Recruit/select manual labour
 Employee training: manual Labour

Plant planning and control
Creativity
Career development and appraisal
Job analysis/specification

Sources: Dainty et al (2003); Fraser (1999); Fraser (2000) and
Egbu (1999) respectively

Appendix 4: Research Instrument for data collection



Republic of Ghana

School of Engineering and the Built Environment
University of Wolverhampton
Wulfruna Street
Wolverhampton
WV1, 1SB
United Kingdom
11/05/06

The Managing Director
Brook Estate Development Co. Ltd
PO Box T 135
Stadium-Accra

Dear Sir/Madam,

Project Managers' Performance in Mass House Building Projects in Ghana

We are pleased to invite you to participate in a *doctoral* research programme seeking to develop a tool for predicting the performance of *project managers* in *Mass House Building Projects* (MHBPs). The Government of Ghana is sponsoring the research. The expected outcome of the research is to help provide a comprehensive data for *project managers* to have a clear idea of what managing directors/senior managers of real estate companies expect of them in the management of MHBPs. Subsequently, those who lack the appropriate skills would be inspired to acquire the relevant training towards best practice improvement. It is also hoped that, *project managers* who already possess the relevant skills may also appreciate the findings as it may provide them the impetus for achieving higher levels of performance. Managing directors/senior managers may also use the findings to establish appropriate guidelines for interviewing and/or engaging the services of *project managers* who have the appropriate skills and competencies.

Consequently, as members of GREDA who regularly employ the services of *project managers*, your participation is important towards establishing the industrial relevance of the study. We shall therefore be very grateful if you would spare some time to complete the attached questionnaire. We assure you that all answers provided will be treated with the strictest confidentiality.

We appreciate that the questionnaire is going to take up some of your valuable time, however, we urge you to try and participate, as your contribution is very important towards the success of the research. To this end, we wish to take this opportunity to thank you in advance for your cooperation.

If you require clarification and any further information, please do not hesitate to contact us

Yours Sincerely,

Divine K. Ahadzie (RMMA211B)
Doctoral Research Student
Tel: +44(0) 1902323581/82
Mob: +44(0) 7821303755
E-mail: divinedka10@yahoo.com
Or D.K.Ahadzie@wlv.ac.uk



QUESTIONNAIRE ON THE PERFORMANCE OF PROJECT MANAGERS IN MASS HOUSE BUILDING PROJECTS IN GHANA

There are three main parts to the questionnaire. The first part of the questionnaire **(SECTION A)**, seeks background information on your classification; how long you have been in business; the type of mass house building projects (MHBPs) you have implemented over the years. The second part **(SECTION B)** is focussing on what performance criteria you consider important for assessing the success of MHBPs. The second part of the questionnaire **(i.e. SECTIONS C & D)** focuses on the behavioural criteria you consider important for evaluating the performance of *project managers* in MHBPs.

The questionnaire is to be completed by **Managing Directors** and/or **Senior Managers** who have the responsibility of engaging and supervising *project managers*. For this purpose, a *project manager* is the person who has the authority and responsibility for the *supervision* and *management* of the *physical construction*.

Please when responding to Sections **B, C and D**, try as much as possible to answer the questions with your first impression as that will be most useful.

Doctoral Research Student
Tel: +44(0) 1902323581/82
Mob: +44(0) 7821303755
E-mail: divinedka10@yahoo.com
Or D.K.Ahadzie@wlv.ac.uk

SECTION A: BACKGROUND INFORMATION	
<p>1) How long have you been a member of GREDA? Please tick (✓) the appropriate box</p> <ul style="list-style-type: none"> Over 20 years <input type="checkbox"/> 16-20 years <input type="checkbox"/> 11- 15 years <input type="checkbox"/> 6-10 years <input type="checkbox"/> Up to 5 years <input type="checkbox"/> 	<p>4) Please indicate the overall value of MHBPs that you have worked on in the last 5 years</p> <ul style="list-style-type: none"> Over 20 Billion cedis (£1.2 million) <input type="checkbox"/> 11 Billion to 20 Billion cedis (£600,000 to £1.2M) <input type="checkbox"/> Up to 10 Billion cedis (£600,000) <input type="checkbox"/>
<p>2) Which of these classifications apply to you?</p> <ul style="list-style-type: none"> Class A <input type="checkbox"/> Class B <input type="checkbox"/> Class C <input type="checkbox"/> Class D <input type="checkbox"/> 	<p>5) Which of the following type of MHBPs do you often undertake?</p> <ul style="list-style-type: none"> Multi-storey, <input type="checkbox"/> Terrace, <input type="checkbox"/> Semi-detached, <input type="checkbox"/> Detached <input type="checkbox"/> Combination of the above <input type="checkbox"/>
<p>3) Please indicate how long you have been involved in the construction of Mass House Building Projects (MHBPs)</p> <ul style="list-style-type: none"> Over 20 years <input type="checkbox"/> 16-20 years <input type="checkbox"/> 11- 15 years <input type="checkbox"/> 6-10 years <input type="checkbox"/> Up to 5 years <input type="checkbox"/> 	<p>6) Which of these indicate the average quantity of house-units you handle/year?</p> <ul style="list-style-type: none"> Up to 20 house-units <input type="checkbox"/> 20-40 house-unit <input type="checkbox"/> 40-60 house-units <input type="checkbox"/> 60-80 house-units <input type="checkbox"/> 80-100 house-units <input type="checkbox"/> Over 100 house-units <input type="checkbox"/>
	<p>7) What is your perception of the performance outcome of PMs you have engaged in MHBPs in recent times. Please rate them according to the following</p> <ul style="list-style-type: none"> Very High (over 90%) <input type="checkbox"/> High (70- 90%) <input type="checkbox"/> Average (50-69%) <input type="checkbox"/> Low (30-49%) <input type="checkbox"/> Very Low (10-29%) <input type="checkbox"/>

SECTION B: OVERALL PERFORMANCE OUTCOME/PROJECT SUCCESS	Not very Very Important Important	Not	Average	Important Important
-------------------------------------------------------------------	------------------------------------------------------	------------	----------------	--------------------------------

How would you rate the **importance** of the following performance criteria for determining the success of Mass House Buildings Projects (MHBP) in Ghana? *Please circle (O) the appropriate number.*

• Overall project cost	5	1	2	3	4
• Cost of individual house-units	5	1	2	3	4
• Overall project duration	5	1	2	3	4
• Rate of delivery of individual house-units	5	1	2	3	4
• Project quality	5	1	2	3	4
• Quality of individual house-units	5	1	2	3	4
• Overall Customer satisfaction	5	1	2	3	4
• Customer satisfaction on individual house-units	5	1	2	3	4
• Overall Risk containment	5	1	2	3	4
• Risk containment on individual house-units	5	1	2	3	4
• Overall Environmental impact	5	1	2	3	4
• Environmental impact of individual house-units	5	1	2	3	4
• Overall health and safety measures	5	1	2	3	4
• Health and safety measures on individual house-units	5	1	2	3	4
• Technology transfer	5	1	2	3	4
	5	1	2	3	4
	5	1	2	3	4

SECTION C: CONTEXTUAL PERFORMANCE BEHAVIOURS

Could you please rate the **importance** of the following behavioural measures for predicting the performance of project managers in mass house building projects in Ghana? *Please circle (O) the appropriate number.*

Not very Important Very Important Not Average Important

C Job dedication

- Perseverance in pushing artisans and/or

works contractors to achieve overall project objectives.	5	1	2	3	4
• Persistence in pushing artisans and/or works contractors to overcome obstacles.	5	1	2	3	4
• Dedication to helping artisans and/or works contractors to achieve all programmes	5	1	2	3	4
• Ability to adapt/make the best out of difficulties faced by artisans and/or works contractors at project sites	5	1	2	3	4
• Developing a sense of conscientiousness towards artisans/works contractors.	5	1	2	3	4
• Commitments towards achieving overall objectives.	5	1	2	3	4
	5	1	2	3	4
C Interpersonal Facilitation					
• Effective time practices management on all project sites.	5	1	2	3	4
• Providing timely information for artisans and/or works contractors.	5	1	2	3	4
• Volunteering to help artisans and/or works contractors solve personal problems	5	1	2	3	4
• Showing compassion and sensitivity towards problems faced by artisans and/or works contractors.	5	1	2	3	4
• Ease with which artisans and/or works contractors are able to approach project manager with their problems.	5	1	2	3	4
• Ability to arrive at effective solutions to conflict while maintaining good relationships.	5	1	2	3	4
• Being aggressive on artisans and/or works contractors towards achieving project objectives.	5	1	2	3	4
• Being honest with artisans and/or works contractors on their performances.	5	1	2	3	4
	5	1	2	3	4

T SECTION D: TASK PERFORMANCE BEHAVIOURS					
Could you please rate the importance of the following behavioural measures for predicting the performance of project managers in mass house building projects in Ghana? <i>Please circle (O) the appropriate number.</i>					
		Not very Important	Very Important	Not	Average Important
T Cognitive ability					
c a 1	• Ability to envisage problems on all house-units under construction.	1	2	3	4
	• Ability to provide alternative solution to problems encountered on all house-units under construction.	5			
		1	2	3	4

	<ul style="list-style-type: none"> Ability to maintain emotional stability when dealing with problems on all house-units under construction. 	5	1	2	3	4
	<ul style="list-style-type: none"> Ability to recall progress of works on all house-units 	5	1	2	3	4
		5	1	2	3	4
		5	1	2	3	4
T j b 1	Job Knowledge					
	<ul style="list-style-type: none"> Knowledge of appropriate construction technology for repetitive works. 	5	1	2	3	4
	<ul style="list-style-type: none"> Knowledge of appropriate cost saving techniques for repetitive construction works. 	5	1	2	3	4
	<ul style="list-style-type: none"> Knowledge of appropriate labour management techniques for repetitive construction works. 	5	1	2	3	4
	<ul style="list-style-type: none"> Knowledge of appropriate programme for delivering repetitive construction works. 	5	1	2	3	4
	<ul style="list-style-type: none"> Knowledge of appropriate quality management techniques for repetitive construction works. 	5	1	2	3	4
	<ul style="list-style-type: none"> Knowledge of appropriate site layout techniques for repetitive construction works. 	5	1	2	3	4
	<ul style="list-style-type: none"> Knowledge of appropriate progressing techniques for monitoring repetitive construction works. 	5	1	2	3	4
	<ul style="list-style-type: none"> Knowledge of appropriate materials management system for repetitive construction works. 	5	1	2	3	4
	<ul style="list-style-type: none"> Knowledge of appropriate health and safety issues for repetitive construction works. 	5	1	2	3	4
	<ul style="list-style-type: none"> Knowledge of appropriate risk management measures for repetitive construction works. 	5	1	2	3	4
	<ul style="list-style-type: none"> Knowledge of appropriate environmental impact assessment for repetitive construction works. 	5	1	2	3	4
	<ul style="list-style-type: none"> Knowledge of appropriate technology transfer for repetitive construction works. 	5	1	2	3	4
T t 2	Task proficiency		Not very Important	Very Important	Not	Average Important
	<ul style="list-style-type: none"> Technical quality of programme for delivering <i>overall house-units</i>. 	5	1	2	3	4
	<ul style="list-style-type: none"> Functional quality of programme for delivering <i>overall house-units</i>. 	5	1	2	3	4
	<ul style="list-style-type: none"> Technical quality of programme for delivering individual house-unit. 	5	1	2	3	4

<ul style="list-style-type: none"> Functional quality of programme for delivering individual house –unit. 	5	1	2	3	4
<ul style="list-style-type: none"> Technical quality of cash-flow programme for the construction of <i>overall house-units</i>. 	5	1	2	3	4
<ul style="list-style-type: none"> Functional quality of cash-flow programme for the construction of <i>overall house-units</i>. 	5	1	2	3	4
<ul style="list-style-type: none"> Technical quality of cash-flow programme for the construction of individual house-units. 	5	1	2	3	4
<ul style="list-style-type: none"> Functional quality of cash-flow programme for the construction of individual house-units. 	5	1	2	3	4
<ul style="list-style-type: none"> Technical quality of specifications provided for the construction of <i>overall house-units</i>. 	5	1	2	3	4
	5	1	2	3	4
Task proficiency		Not very Important	Very Important	Not	Average
		Important			Important
<ul style="list-style-type: none"> Functional quality of specifications provided for the construction of <i>overall house-units</i>. 	5	1	2	3	4
<ul style="list-style-type: none"> Technical quality of specifications provided for the construction of individual house-units. 	5	1	2	3	4
<ul style="list-style-type: none"> Functional quality of specifications provided for individual house-units. 	5	1	2	3	4
<ul style="list-style-type: none"> Technical quality of programme for achieving <i>overall</i> customer/client satisfaction. 	5	1	2	3	4
<ul style="list-style-type: none"> Functional quality of programme for achieving <i>overall</i> customer/client satisfaction. 	5	1	2	3	4
<ul style="list-style-type: none"> Technical quality of programme for achieving customer/client satisfaction on individual house-units. 	5	1	2	3	4
<ul style="list-style-type: none"> Technical quality of risk containment programme for the construction of <i>overall house-units</i>. 	5	1	2	3	4
<ul style="list-style-type: none"> Functional quality of risk containment programme for the construction of <i>overall house-units</i>. 	5	1	2	3	4
<ul style="list-style-type: none"> Technical quality of risk containment programme for the construction of individual house-units. 	5	1	2	3	4
<ul style="list-style-type: none"> Functional quality of risk containment programme for the construction of individual house-unit. 	5	1	2	3	4
<ul style="list-style-type: none"> Technical quality of environmental assessment programme for the construction <i>overall house-units</i>. 	5	1	2	3	4
<ul style="list-style-type: none"> Functional quality of environmental assessment programme for the 		1	2	3	4

construction of <i>overall house-units</i> .	5				
• Technical quality of environmental assessment programme for the construction of individual house-units.	5	1	2	3	4
• Functional quality of environmental assessment programme for the construction of individual house-units.	5	1	2	3	4
• Technical quality of health and safety measures for the construction of <i>overall house-units</i> .	5	1	2	3	4
• Functional quality of health and safety measures for the construction of <i>overall house-units</i> .	5	1	2	3	4
• Technical quality of health and safety measures for the construction of individual house-units.	5	1	2	3	4
• Functional quality of health and safety measures for the construction of individual house-units.	5	1	2	3	4
	5	1	2	3	4

Te	Experience	Not very Important	Very Important	Not	Average
		Important			Important
	• Experiences in managing MHBPs.	1	2	3	4
	• No. of years of practice in construction.	5			
	• Experiences in achieving success in the management of MHBPs.	1	2	3	4
	• Experiences in managing MHBPs of similar nature.				
	• Experience in any type of construction project.	1	2	3	4
	• Membership of appropriate professional body.	1	2	3	4
		5			
	Thank you very much for the effort you have put in.	1	2	3	4
		5			
		1	2	3	4
		5			

On headed letter (University of Wolverhampton)

Appendix 5: Prior notification to potential respondents

The Managing Director
Sample
02/04/06

Dear Managing Director,

**Invitation to participate in a Survey
Project Managers' Performance in Mass House Building Projects in
Ghana**

We are currently involved in a *doctoral* research programme seeking to develop a tool for predicting the performance of *project managers* in *Mass House Building Projects* (MHBP). The Government of Ghana is sponsoring the research. The expected outcome of the research is to help provide a comprehensive data for *project managers* to have a clear idea of what managing directors/senior managers of real estate companies (within the Ghanaian housing industry) expect of them in the management of MHBP. Subsequently, those who lack the appropriate skills would be inspired to acquire the relevant training towards best practice improvement. It is also hoped that, *project managers* who already possess the relevant skills may also appreciate the findings as it may provide them the impetus for achieving higher levels of performance. Managing directors/senior managers may also use the findings to establish appropriate guidelines for interviewing and/or engaging the services of *project managers* who have the appropriate skills and competencies.

In order to give industrial relevance to the study, we wish to invite companies who are registered with the Ghana Real Estate Developers Association (GREDA) to participate in a survey. Consequently, we shall shortly be sending you a questionnaire to complete. The questionnaire will be delivered and collected in person by a representative from the Dept. of Building Technology, Kwame Nkrumah University of Science and Technology (KNUST).

We wish to inform you that the data being sought will be used only for research purposes and your rights and confidentiality will be fully respected. On

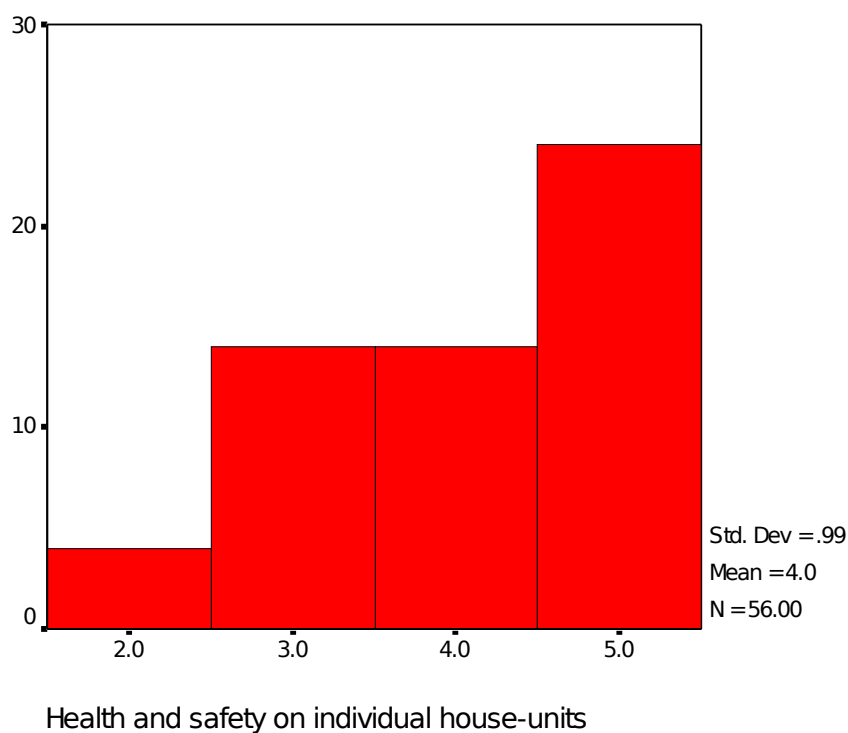
completion of the research, a summary of the report would be made available to interested persons in a format which may be useful training purposes.

You should shortly be receiving the questionnaire. In the meantime if you require clarification and any further information, please do not hesitate to contact us

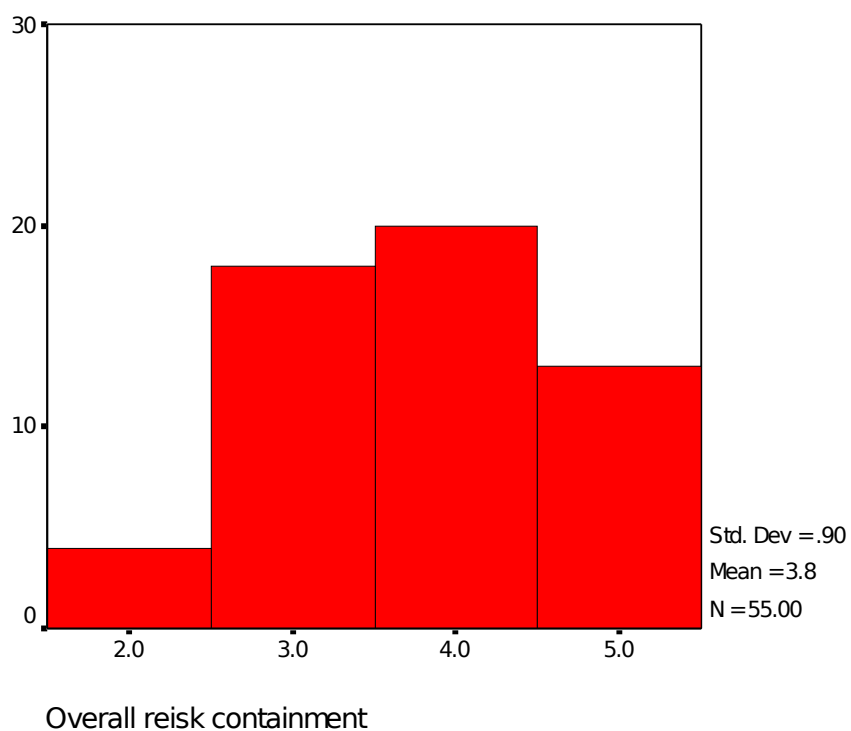
Yours Sincerely,

Divine K. Ahadzie (RMMA211B)
 Doctoral Research Student
 Tel: +44(0) 1902323581/82
 Mob: +44(0) 7821303755
 E-mail: D.K.Ahadzie@wlv.ac.uk

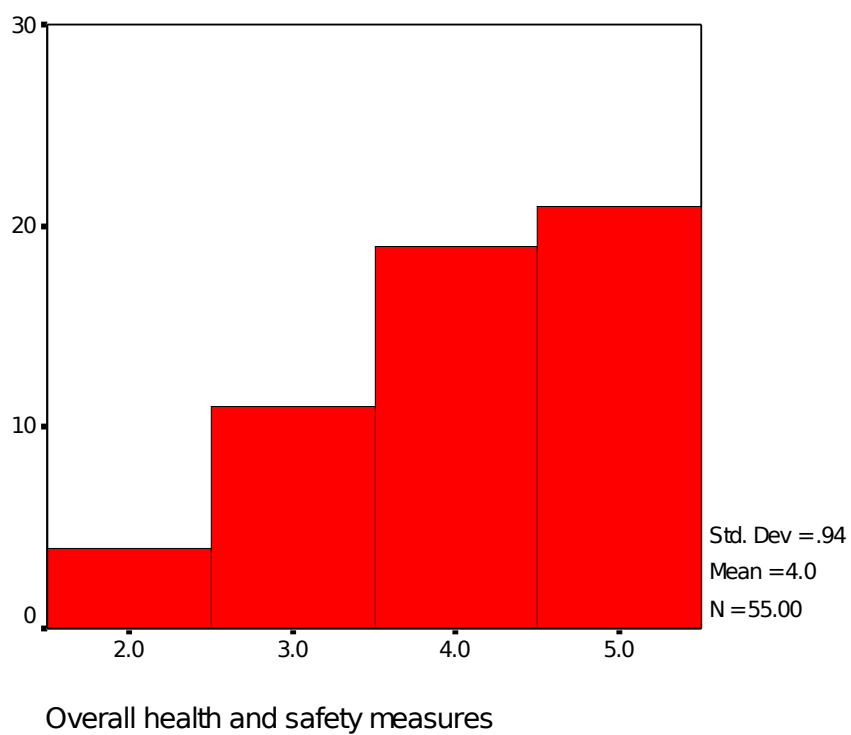
Appendix 6: Histogram for Health and safety of individual house-units



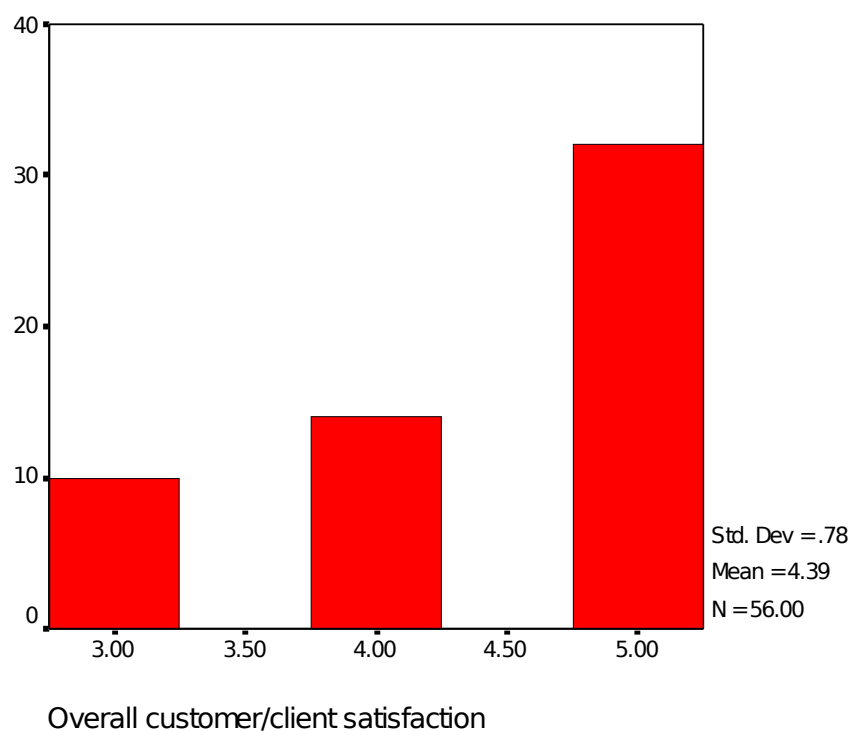
Appendix 7: Histogram of risk containment



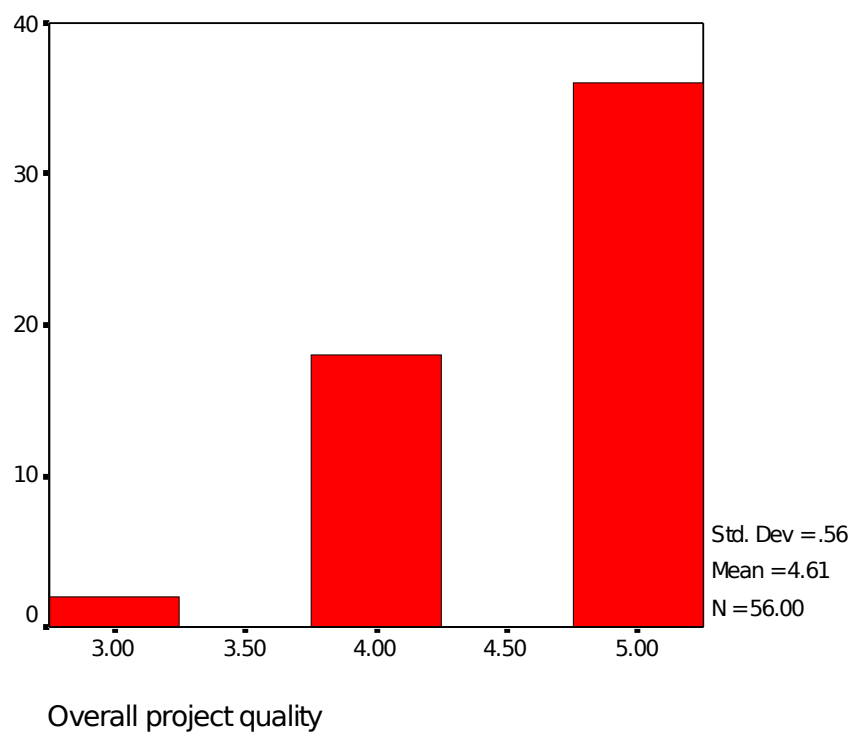
Appendix 8: Histogram of Overall health and safety measures



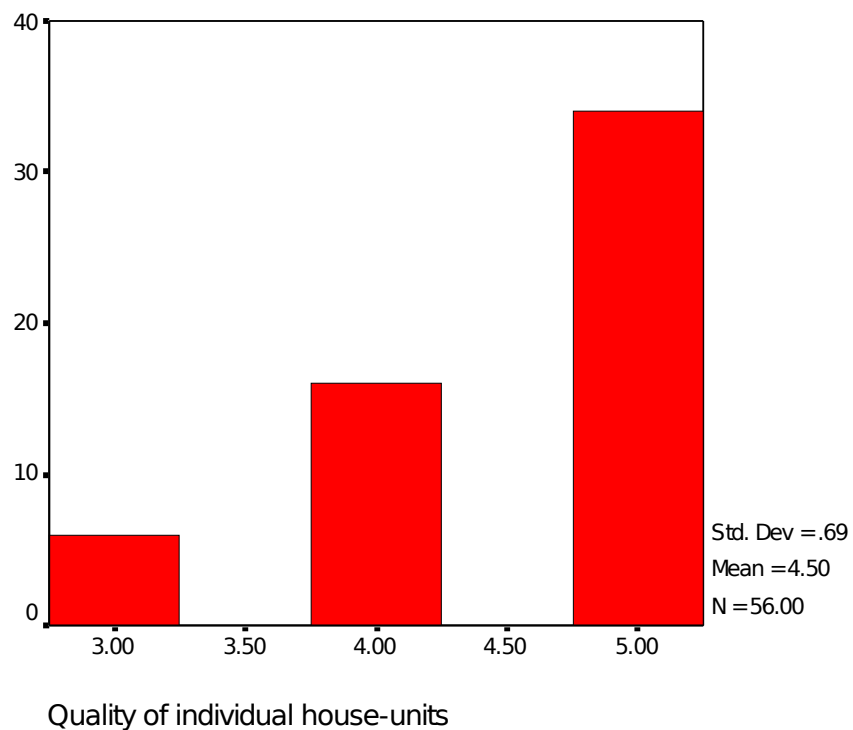
Appendix 9: Histogram of overall customer/client satisfaction



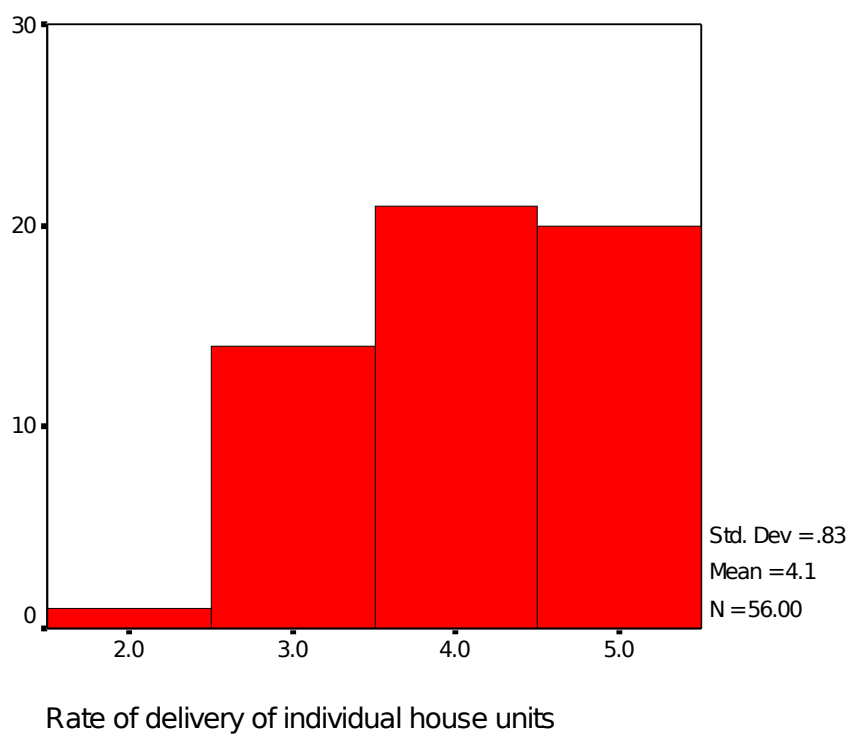
Appendix 10: Histogram of overall project quality



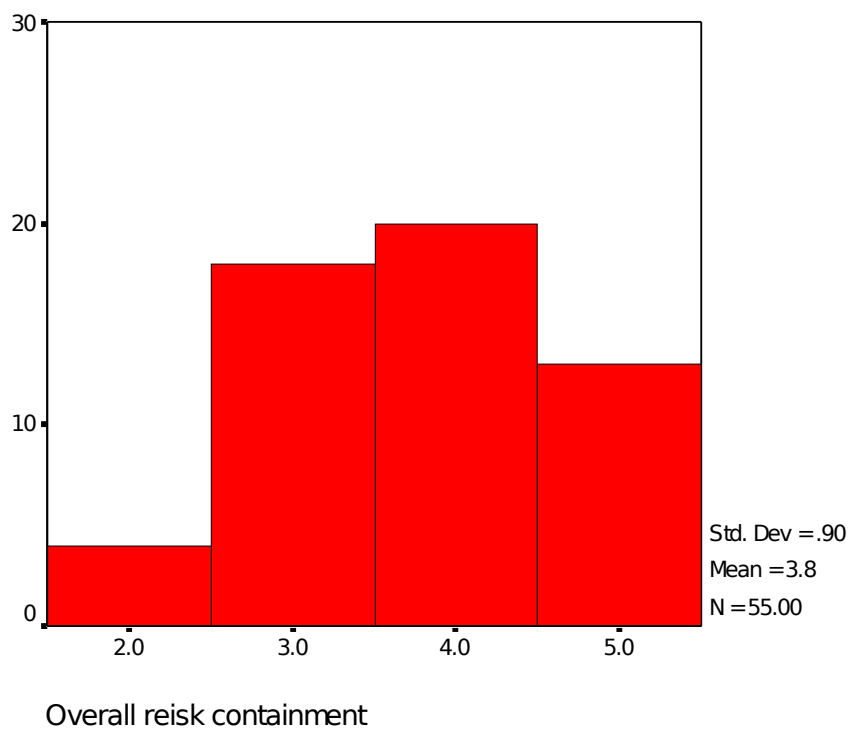
Appendix 11: Histogram of quality of individual house-units



Appendix 12: Histogram of rate of delivery of individual house-units



Appendix 13: Histogram of risk containment



Appendix 14: Guide to correlation matrix/correlation matrix

Variable number	Definition
V1	Performance outcome
V3	Perseverance in pushing works contractors to achieve overall project objectives
V4	Persistence in pushing works contractors to overcome obstacles
V5	Dedication in helping works contractors to achieve works programmes
V6	Ability to adapt/make the best out of difficulties faced by works contractors at projects sites
V7	Developing a sense of conscientiousness toward works contractors
V8	Commitment towards overall project objectives
V9	Effective time management on all project sites.
V10	Providing timely information for works contractors.
V11	Volunteering to help works contractors solve personal problems
V12	Showing compassion and sensitivity towards problems faced by works contractors
V13	Ease with which works contractors are able to approach project manager with their problems
V14	Ability to arrive at effective solutions to conflicts while maintaining good relationships
V15	Being aggressive on works contractors towards achieving project objectives
V16	Being honest with works contractors on their performances
V17	Knowledge of appropriate cost saving techniques for repetitive construction works
V18	Ability to envisage problems on all house-units under construction
V19	Ability to provide alternative solutions to problems encountered on all house-units
V20	Ability to maintain emotional stability when dealing with problems on all house-units under construction
V21	Ability to recall progress of works on all house-units
V22	
V23	

V24	Knowledge of appropriate labour management techniques for repetitive construction works
V25	Knowledge of appropriate programme for delivering repetitive construction works
V26	Knowledge of appropriate quality management techniques for repetitive works
V27	Knowledge of appropriate site layout techniques for repetitive construction works
V28	Knowledge of appropriate progressing techniques for monitoring repetitive construction works
V29	Knowledge of appropriate materials management system for repetitive construction works
V30	Knowledge of appropriate health and safety issues for repetitive construction works
V31	Knowledge of appropriate risk management measures for repetitive construction works.
V31	Knowledge of appropriate environmental impact assessment for repetitive construction works
V32	Knowledge of appropriate technology transfer for repetitive construction
V33	Technical quality of programme for delivering overall house-units
V34	Functional quality of programme for delivering overall house-units
V35	Technical quality of programme for delivering individual house-unit
V36	Functional quality of programme for delivering individual house-unit
V37	Technical quality of cash-flow programme for the construction of overall house-units
V38	Functional quality of cash-flow programme for the construction of overall house-units
V39	Technical quality of cash-flow programme for the construction of individual house-units.
V40	Functional quality of cash-flow programme for the construction of individual house-units.
V41	Technical quality of specifications provided for the construction overall house-units.
V42	Functional quality of specifications provided of overall house-units.
V43	Technical quality of specifications provided for the construction of individual house-units.
V44	Functional quality of specifications provided for individual house-units.
V45	Technical quality of programme for achieving overall customer satisfaction
V46	Functional quality of programme for achieving overall customer satisfaction.
V47	Technical quality of programme for achieving customer satisfaction on individual house-units
V48	Technical quality of risk containment programme for the construction of overall house-units
V49	Functional quality of risk containment programme for the construction of overall house-units
V50	Technical quality of risk containment programme for the construction of individual house-units.
V51	Functional quality of risk containment programme for the construction of individual of house-unit

V52	Technical quality of environmental assessment programme for the construction of overall house-units
V53	Functional quality of environmental assessment programme for the construction of overall house-units
V54	Technical quality of environmental assessment programme for the construction of individual house-units
V55	Functional quality of environmental assessment programme for the construction of individual house-units
V56	Technical quality of health and safety measures for the construction of overall house-units
V57	Functional quality of health and safety measures for the construction of overall house-units
V58	Technical quality of health and safety measures for the construction of individual house-units
V59	Functional quality of health and safety measures for the construction of individual house-units
V60	Experience in managing MHBPs
V61	No. of years of practice in construction
V62	Experience in achieving success in the management of MHBPs
V63	Experience in managing MHBPs of similar nature
V64	Experience in any type of construction project
V65	Membership of appropriate professional body

Note:

Correaltion matrix is on next page

Red ink means correlation is significant at the 0.01 level (2-tailed)

Blue ink means correlation is significant at 0.05 level (2-tailed)

Appendix 15: Correlation matrix of regression analysis

v1	v2	v3	v4	v5	v6	v7	v8	v9	v10	v11	v12	v13	v14	v15	v16	v17	v18	v19	v20	v21	v22	v23	v24	v25	v26	v27	v28	v29	v30	v31	v32	v33	v34	v35	v36	v37	v38	v39	v40	v41	v42	v43	v44	v45	v46	v47	v48	v49	v50	v51	v52	v53	v54	v55	v56	v57	v58	v59	v60	v61	v62	v63	v64	v65																																																																																																																																																																																																																																																																									
v1	1.00	0.46	0.27	0.64	0.51	0.59	0.49	0.39	0.55	0.44	0.38	0.38	0.17	0.23	0.42	0.52	0.58	0.38	0.34	0.31	0.37	0.47	0.55	0.56	0.55	0.67	0.53	0.59	0.62	0.63	0.58	0.61	0.64	0.51	0.48	0.64	0.37	0.42	0.48	0.51	0.61	0.45	0.46	0.51	0.54	0.51	0.51	0.54	0.57	0.52	0.49	0.42	0.44	0.48	0.55	0.49	0.57	0.60	0.58	0.10	0.29	0.18	0.23	0.50	0.30																																																																																																																																																																																																																																																																								
v2	0.46	1.00	0.51	0.44	0.28	0.24	0.42	0.32	0.33	0.08	0.23	0.19	0.22	0.13	0.54	0.59	0.51	0.47	0.37	0.46	0.48	0.30	0.36	0.30	0.32	0.23	0.37	0.40	0.46	0.40	0.28	0.37	0.33	0.34	0.38	0.64	0.37	0.23	0.37	0.29	0.49	0.38	0.38	0.14	0.19	0.20	0.22	0.31	0.41	0.46	0.36	0.40	0.30	0.23	0.24	0.19	0.24	0.22	0.33	0.34	0.33	0.24	-0.11	0.45	0.28	0.04	0.11																																																																																																																																																																																																																																																																						
v3	0.27	0.51	1.00	0.30	0.38	0.30	0.38	0.24	0.35	0.02	0.09	0.24	0.33	0.39	0.47	0.32	0.20	0.32	0.00	0.34	0.32	0.27	0.33	0.32	0.40	0.30	0.30	0.35	0.24	0.16	0.28	0.28	0.29	0.32	0.26	0.29	0.25	0.23	0.30	0.25	0.35	0.33	0.37	0.31	0.35	0.37	0.46	0.47	0.50	0.40	0.30	0.23	0.24	0.19	0.24	0.22	0.33	0.34	0.33	0.24	-0.11	0.45	0.28	0.04	0.11																																																																																																																																																																																																																																																																								
v4	0.64	0.44	0.30	1.00	0.59	0.59	0.39	0.24	0.53	0.49	0.50	0.19	0.22	0.32	0.43	0.48	0.36	0.41	0.25	0.35	0.48	0.41	0.41	0.51	0.45	0.41	0.59	0.60	0.55	0.41	0.34	0.51	0.48	0.49	0.47	0.22	0.23	0.37	0.29	0.54	0.29	0.44	0.43	0.43	0.44	0.53	0.44	0.45	0.48	0.47	0.46	0.45	0.38	0.40	0.46	0.45	0.60	0.62	0.60	0.25	0.44	0.21	0.35	0.30	0.28																																																																																																																																																																																																																																																																								
v5	0.52	0.28	0.38	0.59	1.00	0.48	0.63	0.43	0.53	0.56	0.45	0.42	0.54	0.37	0.55	0.39	0.47	0.28	0.16	0.30	0.34	0.45	0.50	0.57	0.42	0.48	0.56	0.54	0.50	0.36	0.43	0.58	0.48	0.51	0.53	0.37	0.38	0.40	0.43	0.58	0.41	0.32	0.37	0.60	0.62	0.74	0.74	0.71	0.60	0.50	0.43	0.36	0.21	0.19	0.36	0.38	0.45	0.46	0.45	0.32	0.19	0.29	0.22	0.20	0.11																																																																																																																																																																																																																																																																								
v6	0.59	0.24	0.30	0.59	0.48	1.00	0.40	0.25	0.42	0.27	0.10	0.07	0.14	0.34	0.32	0.27	0.19	0.30	0.36	0.26	0.24	0.44	0.53	0.42	0.45	0.36	0.33	0.55	0.50	0.46	0.42	0.48	0.35	0.27	0.38	0.13	0.21	0.19	0.23	0.27	0.35	0.38	0.48	0.46	0.46	0.40	0.41	0.34	0.35	0.40	0.29	0.20	0.18	0.17	0.26	0.24	0.40	0.28	0.32	0.11	0.14	0.17	0.12	0.24	0.22																																																																																																																																																																																																																																																																								
v7	0.49	0.42	0.38	0.39	0.63	0.40	1.00	0.39	0.51	0.20	0.09	0.44	0.49	0.31	0.56	0.47	0.43	0.27	0.16	0.34	0.36	0.49	0.51	0.63	0.57	0.52	0.52	0.45	0.42	0.39	0.38	0.44	0.41	0.32	0.39	0.36	0.41	0.36	0.40	0.49	0.26	0.14	0.25	0.41	0.49	0.47	0.60	0.61	0.53	0.41	0.30	0.23	0.17	0.16	0.32	0.22	0.32	0.28	0.31	0.17	0.08	0.16	0.14	0.15	0.07																																																																																																																																																																																																																																																																								
v8	0.39	0.32	0.24	0.24	0.43	0.25	0.39	1.00	0.47	0.11	0.14	0.32	0.47	0.00	0.40	0.23	0.22	0.23	0.18	0.26	0.19	0.35	0.36	0.43	0.31	0.32	0.37	0.19	0.24	0.21	0.28	0.12	0.43	0.51	0.43	0.42	0.32	0.27	0.30	0.43	0.50	0.42	0.31	0.38	0.54	0.41	0.49	0.42	0.34	0.37	0.31	0.22	0.18	0.26	0.34	0.34	0.36	0.29	0.35	0.27	-0.03	0.16	0.10	0.08	0.27																																																																																																																																																																																																																																																																								
v9	0.55	0.33	0.35	0.53	0.53	0.42	0.51	0.47	1.00	0.36	0.25	0.31	0.43	0.06	0.52	0.29	0.33	0.39	0.24	0.29	0.18	0.40	0.38	0.53	0.39	0.44	0.34	0.34	0.42	0.43	0.37	0.29	0.30	0.31	0.25	0.40	0.55	0.49	0.45	0.52	0.56	0.45	0.43	0.45	0.45	0.54	0.57	0.61	0.58	0.54	0.54	0.41	0.36	0.33	0.38	0.34	0.35	0.48	0.49	0.49	0.11	0.05	0.11	0.10	0.24	0.32																																																																																																																																																																																																																																																																							
v10	0.44	0.08	0.22	0.49	0.56	0.27	0.20	0.10	0.11	0.36	1.00	0.72	0.45	0.43	0.06	0.26	0.26	0.14	0.35	0.05	0.14	0.25	0.23	0.20	0.23	0.13	0.33	0.33	0.43	0.37	0.24	0.41	0.33	0.26	0.19	0.14	0.19	0.28	0.27	0.32	0.19	0.17	0.23	0.34	0.14	0.24	0.30	0.33	0.36	0.31	0.23	0.29	0.31	0.29	0.33	0.35	0.42	0.44	0.44	0.40	0.11	0.22	0.00	0.16	0.13																																																																																																																																																																																																																																																																								
v11	0.38	0.23	0.09	0.50	0.45	0.10	0.09	0.14	0.25	0.72	1.00	0.52	0.39	0.00	0.29	0.40	0.39	0.38	0.16	0.34	0.35	0.27	0.22	0.18	0.00	0.26	0.36	0.41	0.34	0.26	0.39	0.45	0.37	0.38	0.31	0.23	0.27	0.30	0.25	0.43	0.13	0.09	0.03	0.14	0.16	0.37	0.24	0.18	0.11	0.24	0.45	0.42	0.42	0.44	0.45	0.47	0.45	0.48	0.27	0.37	0.20	0.33	0.16	0.10																																																																																																																																																																																																																																																																									
v12	0.38	0.19	0.24	0.19	0.42	0.07	0.44	0.32	0.31	0.45	0.52	1.00	0.62	0.08	0.36	0.50	0.32	0.28	0.29	0.48	0.43	0.36	0.32	0.35	0.24	0.43	0.41	0.27	0.15	0.08	0.34	0.44	0.38	0.44	0.54	0.45	0.42	0.48	0.46	0.52	0.43	0.39	0.57	0.07	0.15	0.30	0.31	0.28	0.36	0.33	0.27	0.17	0.21	0.24	0.27	0.28	0.38	0.37	0.32	0.32	0.33	0.27	0.13	0.05	0.11	0.10																																																																																																																																																																																																																																																																							
v13	0.17	0.22	0.33	0.22	0.54	0.14	0.49	0.47	0.43	0.43	0.39	0.62	1.00	0.06	0.45	0.40	0.35	0.37	0.20	0.42	0.27	0.45	0.49	0.32	0.25	0.43	0.42	0.36	0.33	0.15	0.22	0.32	0.31	0.34	0.26	0.41	0.41	0.34	0.41	0.44	0.37	0.23	0.29	0.28	0.34	0.34	0.41	0.46	0.46	0.35	0.30	0.24	0.24	0.22	0.28	0.29	0.39	0.31	0.26	0.29	0.31	0.00	0.17	0.07	0.03	0.16																																																																																																																																																																																																																																																																							
v14	0.23	0.13	0.39	0.32	0.37	0.34	0.31	0.00	0.06	0.06	0.08	0.06	1.00	0.26	0.16	0.16	0.08	0.06	0.21	0.22	0.32	0.16	0.23	0.42	0.19	0.19	0.34	0.32	0.25	0.12	0.18	0.31	0.18	0.20	0.29	0.10	-0.03	0.05	0.07	0.19	0.12	0.11	0.23	0.18	0.22	0.22	0.34	0.33	0.24	0.20	0.13	-0.03	-0.09	-0.14	-0.03	0.05	0.06	0.04	0.12	0.08	0.22	0.26	0.11	-0.05																																																																																																																																																																																																																																																																									
v15	0.42	0.54	0.47	0.43	0.55	0.32	0.56	0.40	0.52	0.26	0.29	0.36	0.45	0.26	1.00	0.52	0.63	0.54	0.30	0.39	0.38	0.35	0.41	0.35	0.38	0.33	0.37	0.42	0.31	0.31	0.26	0.43	0.33	0.24	0.53	0.55	0.49	0.32	0.41	0.55	0.47	0.36	0.30	0.24	0.34	0.46	0.51	0.49	0.63	0.46	0.40	-0.32	0.35	-0.19	0.19	0.28	0.24	0.34	0.35	0.35	0.29	0.03	0.21	0.24	0.09	0.12																																																																																																																																																																																																																																																																							
v16	0.52	0.59	0.32	0.48	0.39	0.27	0.47	0.23	0.29	0.26	0.40	0.50	0.40	0.16	0.52	1.00	0.73	0.58	0.29	0.60	0.75	0.51	0.56	0.40	0.40	0.50	0.54	0.42	0.43	0.28	0.48	0.55	0.49	0.46	0.59	0.41	0.46	0.41	0.43	0.65	0.53	0.43	0.33	0.32	0.35	0.44	0.40	0.47	0.50	0.40	0.44	0.49	0.45	0.44	0.50	0.45	0.45	0.52	0.46	0.45	0.52	0.46	0.45	0.52	0.46	0.45	0.52	0.46	0.45	0.52	0.46	0.45	0.52	0.46	0.45	0.52	0.46	0.45	0.52	0.46	0.45	0.52	0.46	0.45	0.52	0.46	0.45	0.52	0.46	0.45	0.52	0.46	0.45	0.52	0.46	0.45	0.52	0.46	0.45	0.52	0.46	0.45	0.52	0.46	0.45	0.52	0.46	0.45	0.52	0.46	0.45	0.52	0.46	0.45	0.52	0.46	0.45	0.52	0.46	0.45	0.52	0.46	0.45	0.52	0.46	0.45	0.52	0.46	0.45	0.52	0.46	0.45	0.52	0.46	0.45	0.52	0.46	0.45	0.52	0.46	0.45	0.52	0.46	0.45	0.52	0.46	0.45	0.52	0.46	0.45	0.52	0.46	0.45	0.52	0.46	0.45	0.52	0.46	0.45	0.52	0.46	0.45	0.52	0.46	0.45	0.52	0.46	0.45	0.52	0.46	0.45	0.52	0.46	0.45	0.52	0.46	0.45	0.52	0.46	0.45	0.52	0.46	0.45	0.52	0.46	0.45	0.52	0.46	0.45	0.52	0.46	0.45	0.52	0.46	0.45	0.52	0.46	0.45	0.52	0.46	0.45	0.52	0.46	0.45	0.52	0.46	0.45	0.52	0.46	0.45	0.52	0.46	0.45	0.52	0.46	0.45	0.52	0.46	0.45	0.52	0.46	0.45	0.52	0.46	0.45	0.52	0.46	0.45	0.52	0.46	0.45	0.52	0.46	0.45	0.52	0.46	0.45	0.52	0.46	0.45	0.52	0.46	0.45	0.52	0.46	0.45	0.52	0.46	0.45	0.52	0.46	0.45	0.52	0.46	0.45	0.52	0.46	0.45	0.52	0.46	0.45	0.52	0.46	0.45	0.52	0.46	0.45	0.52	0.46	0.45	0.52	0.46	0.45	0.52	0.46	0.45	0.52	0.46	0.45	0.52	0.46	0.45	0.52	0.46	0.45	0.52	0.46	0.45	0.52	0.46	0.45	0.52	0.46	0.45	0.52	0.46	0.45	0.52	0.46	0.45	0.52	0.46	0.45	0.52	0.46	0.45	0.52	0.46	0.45	0.52	0.46	0.45	0.52	0.46	0.45	0.52	0.46	0.45	0.52	0.46	0.45	0.52	0.46	0.45	0.52	0.46	0.45	0.52	0.

Appendix 16: Questionnaire for validation of the potential recommended application of a model for predicting the performance of project managers in MHBP in Ghana.



School of Engineering and the Built Environment
University of Wolverhampton
Wulfruna Street
Wolverhampton
WV1, 1SB
United Kingdom
29/05/07

Dear Sir/Madam,

Project Managers' Performance in Mass House Building Projects in Ghana

As part of an ongoing *doctoral* research programme we have identified and developed a set of variables that we believe can be used to engender managerial best practices of project managers in MHBPs in Ghana.

The findings of our research indicate that if project managers are to engender their managerial skills in MHBPs, they must among others have the knowledge and skills associated with the following themes:

- Site layout techniques for repetitive construction works.
- Appropriate technology transfer for repetitive construction works.
- Dedication in helping works contractors and/or artisans achieve works schedule.
- Effective time management practices on house-units
- Ability to provide solution to conflicts while maintaining good relationships
- Ease of approachability of the PM by works contractors and/or artisans
- Volunteering to help works contractors and/or artisans solve personal problems

It is intended to further develop these variables into a management toolkit so that property developers and other interested stakeholders can use it as a guide for the recruitment and appointment of project managers who have the appropriate competencies and skills. It is also intended that the findings could further be developed as foundation for developing the training requirements of aspiring projects managers and the continuing professional development of experience project managers in the management of MHBPs.

In view of this, we would be very grateful if you could please respond to the one-page questionnaire attached, to help establish the relevance of the findings and potential application in Ghana. The questionnaire will take less 10 minutes to be complete. We

count on your cooperation and thank you very much in advance.

Yours Sincerely,

Divine K. Ahadzie (RMMA212B)
 Doctoral Research Student
 Tel: +44(0) 1902323581/82

	Important	Important	Important	Important	Important
1. Could you please rate the importance of the variables identified as the most critical for engendering the performance of project managers in MHBPs in Ghana. Please circle the appropriate number					
• Knowledge of appropriate Site layout techniques	5	1	2	3	4
• Knowledge of appropriate technology transfer	5	1	2	3	4
• Dedication of the project manager	5	1	2	3	4
• Ability to solve conflicts effectively	5	1	2	3	4
• Effective time management practices	5	1	2	3	4
• Ease of approachability of project managers by works contractors and/or artisans.	5	1	2	3	4
• Regularly Volunteering to help works contractors and/or artisans solve personal problems	5	1	2	3	4
2. Do you agree that it is important to, further develop these themes into a management toolkit/checklist for practical application in Ghana? Please circle the appropriate number.	5	1	2	3	4
3. Would you consider it important for the themes identified above to be further developed as a foundation for curriculum development, for the training of project managers in the management of MHBPs in Ghana.	5	1	2	3	4
4. Would you consider it important for these themes to be further developed into a management checklist, so that property developers can use them as a guide for recruiting and appointing potential project managers for MHBPs	5	1	2	3	4
5. Please indicate your willingness to use the management toolkit/checklist if developed for practical application, by circling the relevant number	5	1	2	3	4
6. Please can you give your own assessment of the intended application of the findings of the research and suggestions for any other future application ...					

.....
.....
.....
.....
.....
.....

.....
.....
.....
.....
.....

Thank you very much.